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SESSIONAL PAPERS

VOL. XXXI.—PART VIII.

FIRST AND SECOND SESSIONS,

NINTH LEGISLATURE

OF THE

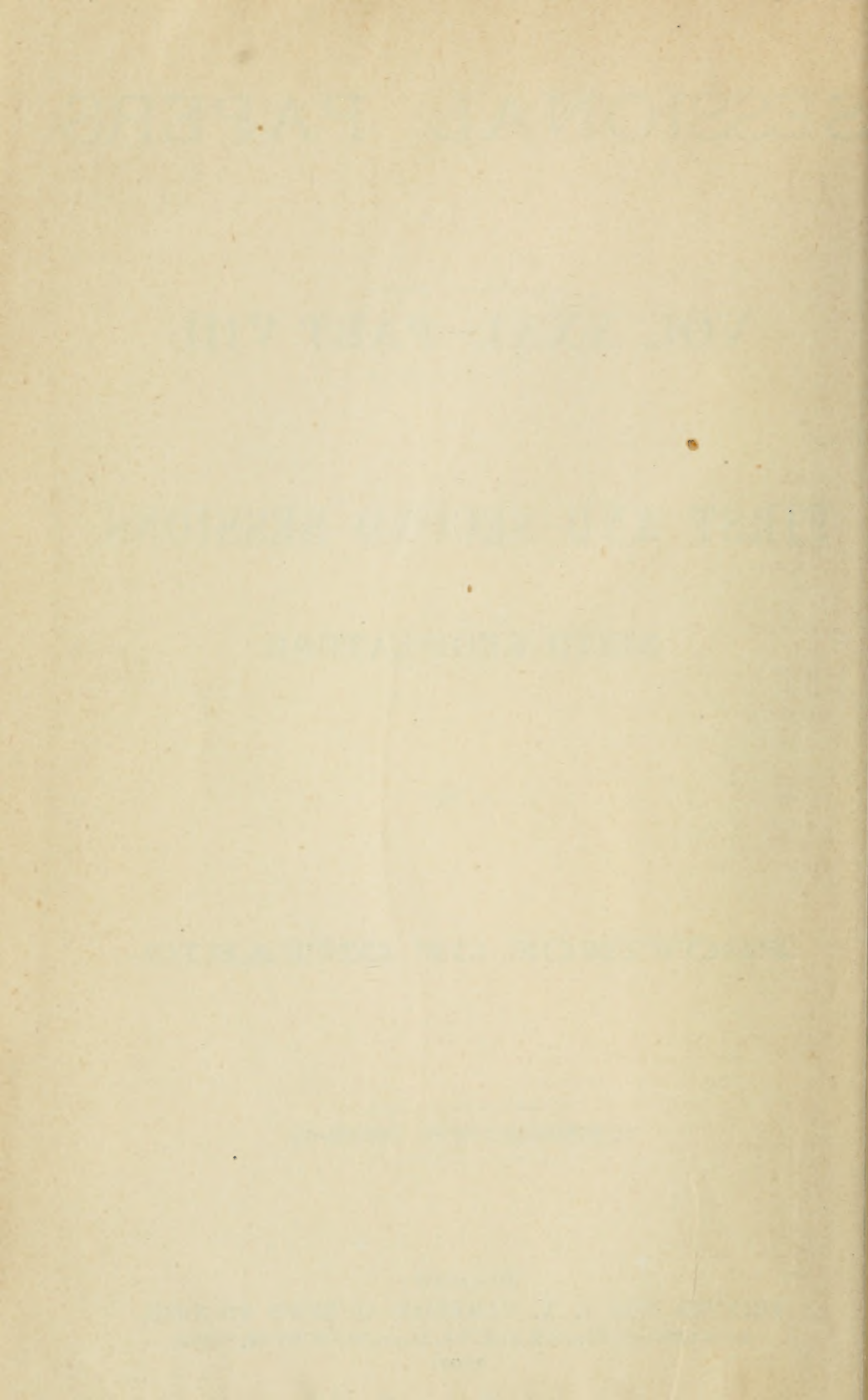
PROVINCE OF ONTARIO.

SESSIONS 1898-9.

TO *ONTARIO* :

PRINTED FOR L. K. CAMERON, QUEEN'S PRINTER,
By WARWICK BRO'S & RUTTER, 68 AND 70 FRONT ST. WEST.

1899.



LIST OF SESSIONAL PAPERS.

ARRANGED ALPHABETICALLY.

TITLE.	No.	REMARKS.
Accounts, Public	3	<i>Printed.</i>
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Agricultural and Experimental Union, Report	19	"
Agricultural and Horticultural Societies, Report	36	"
Asylums, Report	11	"
Bee-Keepers Association, Report	24	<i>Printed.</i>
Birds and birds nests, collection of	71	<i>Not printed.</i>
Births, Marriages and Deaths, Report	32	<i>Printed.</i>
Blind Institute, Report	15	"
Butter and Cheese Associations, Report	27	"
Central Prison, Rope manufacture at	58	<i>Not printed.</i>
Childrens Protection Act, Report	17	<i>Printed.</i>
Common Gaols, Prisons, etc., Report	12	"
Corundum lands, O. in C	46	<i>Not printed.</i>
Crown Lands, Report	5	<i>Printed.</i>
Deaf and Dumb Institute, Report	16	<i>Printed.</i>
Deer, shooting of in water	70	<i>Not printed.</i>
Division Courts, Report	7	<i>Printed.</i>
Education, Report	2	<i>Printed.</i>
" Minutes of Department of	44	<i>Not printed.</i>
" Specialists' Certificates	66	<i>Printed.</i>
" Correspondence re Grant	69	<i>Not printed.</i>
Elections, Return from Records	1	<i>Printed.</i>
Entomological Society, Report	23	"
Estimates	4	"
Factories, Report	30	<i>Printed.</i>
Farmers Institutes, Report	29	"
Forestry, Clerk of, Report	73	"
" Commission, Report	35	"
Fruit Experiment Stations, Report	21	"
Fruit Growers, Report	20	"

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Game and Fish Commission, Report	33	<i>Printed.</i>
Gaols, Prisons and Reformatories, Report	12	"
Grant Examination Papers	69	<i>Not printed.</i>
Health, Board of, Report	39	<i>Printed.</i>
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Industries, Bureau of, Report	37	"
Insurance, Report	10	"
Judicature Act, Judges fees under	53, 54	<i>Not printed.</i>
Legal Offices, Report	31	<i>Printed.</i>
Librarian, Report on state of Library	51	<i>Not printed.</i>
Lincoln License Inspector	64	"
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Loan Corporations, Report	40	<i>Printed.</i>
London Normal School	56	<i>Not printed.</i>
Live Stock Associations, Report	28	<i>Printed.</i>
McCrea, Hiram Augustus	57	<i>Not printed.</i>
Marmora, Miller's Report <i>re</i> gold	68	"
Michipicoten Mining Division	49	"
Mines, Report	38	<i>Printed.</i>
Mining Divisions, regulations	47	<i>Not printed.</i>
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Municipal Auditor, Provincial, Report	41	<i>Printed.</i>
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Ontario Gold Concessions, Report	80	<i>Printed.</i>
Police Magistrates, names of	76	<i>Not printed.</i>
Poultry Associations, Report	25	<i>Printed.</i>
Printing Paper Contract	61	<i>Not printed.</i>
" papers and correspondence	65	"
Provincial Municipal Auditor, Report	41	<i>Printed.</i>
Public Accounts	3	"
Public Works, Report	9	"
Queen Victoria Niagara Falls Park, Report	34	<i>Printed.</i>

TITLE.	No.	REMARKS.
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Spraying, Report on	22	"
Statute distribution	55	<i>Not printed.</i>
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Sturgeon Falls Pulp Co'y. Agreement	74	<i>Printed.</i>
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Timber berths sold since March, 1898 ...	63	<i>Not printed.</i>
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Toronto University, Reports	50	<i>Printed.</i>
Upper Canada College, Hodgsons Report	42	<i>Not printed.</i>
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" Principals Report	60	<i>Printed.</i>
Water Powers, regulations	45	<i>Not printed.</i>
Waterloo House of Refuge, Report	52	"



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Arranged in Numerical Order with their titles at full length; the dates when Ordered and when presented to the Legislature; the name of the Member who moved the same, and whether Ordered to be Printed or not.

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- No. 1.. Return from the Records of the General Election to the Legislative Assembly in 1898, shewing : (1) The number of Votes polled for each Candidate in each Electoral District in which there was a contest. (2) The majority whereby each successful Candidate was returned. (3) The total number of Votes polled in each District. (4) The number of Votes remaining unpolled. (5) The number of names on the Voters' List in each District. (6) The population of each District as shown by the last Census. Presented to the Legislature, 3rd August 1898, and also :—Return from the Records since the General Election to the Legislative Assembly in 1898, shewing :—(1) The number of Votes polled for each Candidate in each Electoral District in which there was a contest. (2) The majority whereby each successful Candidate was returned. (3) The total number of Votes polled in each District. (4) The number of Votes remaining unpolled. (5) The number of names on the Voters' List in each District. (6) The population of each District as shown by the last Census. Presented to the Legislature, 1st February 1899. *Printed.*
- No. 2.. Report of the Minister of Education for the year 1898, with the Statistics of 1897. Presented to the Legislature 3rd March, 1899. *Printed.*

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- No. 3.. Public Accounts of the Province for the year 1898, Presented to the Legislature 8th February, 1899. *Printed.*
- No. 4.. Estimates for the year 1899. Presented to the Legislature 8th February 1899. *Printed.* Estimates (supplementary) for the year 1899. Presented to the Legislature 30th March, 1899. *Printed.*
- No. 5.. Report of the Commissioner of Crown Lands for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*

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- No. 6.. Report of the Department of Immigration for the year 1898. Presented to the Legislature 17th March, 1899. *Printed.*

- No. 7.. Report of the Inspector of Division Courts for the year 1898. Presented to the Legislature 23rd February, 1899. *Printed.*
- No. 8.. Report on the working of the Tavern and Shop Licenses Acts for the year 1898. Presented to the Legislature 15th February, 1899. *Printed.*
- No. 9.. Report of the Commissioner of Public Works for the year 1898. Presented to the Legislature 23rd February, 1899. *Printed.*
- No. 10.. Report of the Inspector of Insurance and Registrar of Friendly Societies for the year 1898. Presented to the Legislature 27th February, 1899. *Printed.*

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- No. 11.. Report upon the Lunatic and Idiot Asylums for the Province for the year ending 30th September, 1898. Presented to the Legislature 23rd February, 1899. *Printed.*
- No. 12.. Report upon the Common Gaols, Prisons and Reformatories of the Province for the year ending 30th September, 1898. Presented to the Legislature 17th March, 1899. *Printed.*
- No. 13.. Report upon the Houses of Refuge and Orphan and Magdalen Asylums of the Province for the year ending 30th September, 1898. Presented to the Legislature 29th March, 1899. *Printed.*
- No. 14.. Report upon the Hospitals of the Province for the year ending the 30th September, 1898. Presented to the Legislature 27th March, 1899. *Printed.*
- No. 15.. Report upon the Institution for the Education of the Blind, Brantford, for the year ending 30th September, 1898. Presented to the Legislature 8th February, 1899. *Printed.*
- No. 16.. Report upon the Institution for the Education of the Deaf and Dumb, Belleville, for the year ending 30th September, 1898. Presented to the Legislature 8th February, 1899. *Printed.*
- No. 17.. Report of the Work under the Children's Protection Act for the year 1898. Presented to the Legislature 23rd February, 1899. *Printed.*

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- No. 18.. Report of the Ontario Agricultural College and Experimental Farm for the year 1898. Presented to the Legislature 14th March, 1899. *Printed.*
- No. 19.. Report of the Agricultural and Experimental Union of Ontario for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*

- No. 20.. Report of the Fruit Growers' Association of Ontario for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*
- No. 21.. Report of the Fruit Experiment Stations of Ontario for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*
- No. 22.. Report of the Superintendent of Spraying for the year 1898. Presented to the Legislature 17th March, 1899. *Printed.*
- No. 23.. Report of the Entomological Society of Ontario for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*
- No. 24.. Report of the Bee Keepers' Association for the Province for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*
- No. 25.. Report of the Poultry and Pet Stock Association of the Province for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*

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- No. 26.. Report of the Provincial Instructor in Road Making in Ontario for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*
- No. 27.. Report of the Butter and Cheese Associations of the Province for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*
- No. 28.. Report of the Live Stock Associations of the Province for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*
- No. 29.. Report of the Superintendent of Farmers' Institutes of the Province for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*

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- No. 30.. Report of the Inspectors of Factories for the Province for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*
- No. 31.. Report of the Inspector of Legal Offices for the year 1898. Presented to the Legislature 10th March, 1899. *Printed.*
- No. 32.. Report upon the Registration of Births, Marriages and Deaths in the Province for the year 1897. Presented to the Legislature 27th February, 1899. *Printed.*
- No. 33.. Report of the Ontario Game and Fish Commission. Presented to the Legislature 17th March, 1899. *Printed.*
- No. 34.. Report of the Commissioners for the Queen Victoria Niagara Falls Park for the year 1898. Presented to the Legislature 24th February, 1899. *Printed.*

No. 35.. Report of the Royal Commission on Forest Protection and Perpetuation in Ontario, 1898. Presented to the Legislature 25th March, 1899. *Printed.*

No. 36.. Analysis of Reports of Agricultural and Horticultural Societies of Ontario for the year 1897. Presented to the Legislature 22nd March, 1899. *Printed.*

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No. 37.. Report of the Bureau of Industries for the year 1898. Presented to the Legislature 22nd March, 1898. *Printed.*

No. 38.. Report of the Bureau of Mines for the year 1898. Presented to the Legislature 29th March, 1899. *Printed.*

No. 39.. Report of the Board of Health for the year 1898. Presented to the Legislature 28th February, 1899. *Printed.*

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No. 40.. Report of the Financial Statements made by Loan Corporations for the year 1898. Presented to the Legislature 29th March, 1899. *Printed.*

No. 41.. Report of the Provincial Municipal Auditor for the year 1898. Presented to the Legislature 20th February, 1899. *Printed.*

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No. 43.. Copy of Order in Council approving of certain appointments on the Staff of Upper Canada College. Presented to the Legislature 10th August, 1898. *Not printed.*

No. 44.. Copy of Minutes of the Department of Education approving of certain Regulations. Presented to the Legislature 10th August, 1898. *Not printed.*

No. 45.. Copy of an Order in Council approving of Regulations governing the disposal of Water Powers. Presented to the Legislature, 19th August 1898. *Not printed.*

No. 46.. Copy of an Order in Council respecting the terms and conditions governing the lease of Corundum Lands. Presented to the Legislature 19th August, 1898. *Not printed.*

No. 47.. Copy of an Order in Council approving of Regulations for Mining Divisions. Presented to the Legislature, 24th August, 1898. *Not printed.*

- No. 48... Copy of an Order in Council approving of certain amendments to the Regulations for Mining Divisions. Presented to the Legislature, 24th August, 1898. *Not printed.*
- No. 49... Copy of an Order in Council establishing the Michipicoten Mining Division. Presented to the Legislature, 24th August, 1898. *Not printed.*
- No. 50... Reports relating to Toronto University. Presented to the Legislature, 2nd March, 1899. *Printed.*
- No. 51... Report of the Librarian on the state of the Legislative Library. Presented to the Legislature, 2nd February, 1899. *Not printed.*
- No. 52... Report of the Inspector of the House of Refuge, County of Waterloo, Presented to the Legislature, 8th February, 1899. *Not printed.*
- No. 53... Copy of Order in Council respecting the payment of surplus Surrogate Court Fees to Judge Jamieson. Presented to the Legislature, 8th February, 1899. *Not printed.*
- No. 54... Copies of Orders in Council commuting Surrogate Court Fees of Judges Huges, Barron, Elliott, Doyle, Monck and Mosgrove. Presented to the Legislature, 8th February, 1899. *Not printed.*
- No. 55... Statement as to the disposal of the Sessional and Revised Statutes of Ontario. Presented to the Legislature, 8th February, 1899. *Not printed.*
- No. 56... Return to an Address to His Honour the Lieutenant-Governor of the tenth day of August, 1898, praying that he will cause to be laid before this House a Return of copies of all Orders in Council, correspondence and other documents relating to the deciding upon, and purchase of a site in the City of London for the proposed Normal School. Presented to the Legislature, 14th February, 1899. *Mr. Hodgins. Not printed.*
- No. 57... Return to an Order of the House of the seventeenth day of August, 1898, for a Return of copies of all correspondence and papers relating to, or connected with, the confinement of Hiram Augustus McCrea in the Asylums at Kingston and Brockville, and his release therefrom. Presented to the Legislature, 17th February, 1899. *Mr. Beatty (Leeds.) Not printed.*
- No. 58... Copy of an Agreement between the Inspector of Prisons and Public Charities and the Independent Cordage Company of Ontario (Limited), respecting the manufacture of Rope at the Central Prison, Toronto. Presented to the Legislature, 20th February, 1899. *Not printed.*
- No. 59... Report of the Master of Titles for the year 1898. Presented to the Legislature, 23rd March, 1899. *Not printed.*

- No. 60.. Report of the Principal of Upper Canada College for the year ending 30th June, 1898, and statements shewing receipts and disbursements for the same period. Presented to the Legislature, 23rd February, 1899. *Printed.*
- No. 61.. Copy of Contract, between Her Majesty the Queen and the Riordan Paper Company, for the supply of printing paper required by the Government of the Province of Ontario. Presented to the Legislature, 23rd February, 1899. *Not printed.*
- No. 62.. Return to an Order of the House of the seventeenth day of August, 1898, for a Return showing the number of saw-logs cut during the winter of 1897-1898 on the limits of the Georgian Bay and on Lakes Huron and Superior, which were driven to either of said lakes; the quantity cut in Provincial mills, and the quantity of exported uncut. Presented to the Legislature, 23rd February, 1899. *Mr. Beatty (Leeds.) Not printed.*
- No. 63.. Return to an Order of the House of the twenty fourth day of August, 1898, for a Return of copies of all correspondence between any member of the Government or representative thereof, and any party or parties, respecting the purchase of any timber berth that may have been sold since March 1st, 1898. Presented to the Legislature, 28th February, 1899. *Mr. Wardell. Not printed.*
- No. 64.. Return to an Order of the House of the twenty-second day of February, 1899, for a Return of copies of all correspondence between any member of the Government and the License Inspector for the County of Lincoln, and any other person or persons, referring to or respecting the alleged connection of the Inspector with the business of cigar manufacture. Presented to the Legislature, 28th February, 1899. *Mr. Jessop. Not printed.*
- No. 65.. Return to an Order of the House of the seventeenth day of February, 1899, for a Return of copies of all papers and documents in relation to the proposed contract for public printing, including specifications, tenders and a comparative statement shewing the different tenders for each item of the specification and the estimate of quantities required. Also, the total estimated amount of each tender. Also, of copies of all correspondence, if any, between the Queen's Printer and the heads of Departments as to preparation of specifications for contract for public printing. Also, of all reports, if any, of expert printers as to details of said specifications and also of all other correspondence appertaining thereto, or to the letting of the contract or conditions required from the contractor. Presented to the Legislature, 3rd March, 1899. *Mr. Mutheson. Not printed.*
- No. 66.. Return to an Order of the House of the twenty-sixth day of February, 1897, for a Return giving the names of all High School Teachers who have received Specialists' Certificates since 1885 as the result of examinations. The names of such teachers who received Specialists' Certificates on any other ground, stating the year in

which such certificate was granted, on what grounds, and the University standing of the recipient. Names of all applicants for such certificates who have been refused them, and on what grounds such refusal was based. Presented to the Legislature, 9th March, 1899. *Mr. Matheson. Printed.*

- No. 67.. Return to an Order of the House of the twenty-seventh day of February 1899, for a Return of copies of all correspondence between the Government or any member thereof, and the Corporation of the Town of Lindsay, with reference to the appointment of a Police Magistrate and the salary to be paid him. Also, copy of Order in Council appointing Police Magistrate at Lindsay. Presented to the Legislature, 9th March, 1899. *Mr. Fox. Not printed.*
- No. 68.. Return to an Order of the House of the eighth day of March, 1899, for a Return of a copy of Miller's Report as to discovery of gold in the Township of Marinora, the same to be brought down during the present Session. Presented to the Legislature, 10th March, 1899. *Mr. McLaughlin. Not printed.*
- No. 69.. Return to an Order of the House of the fifteenth day of December, 1897, for a Return of copies of all correspondence between the Minister of Education, or any official in the Department and Mr. Stewart of Glencoe, or any other person, in reference to the case of C. C. Grant of St. Thomas, who was charged with having obtained copies of the examination papers before the Matriculation Examination in 1896. Presented to the Legislature, 13th March, 1899. *Mr. Brower. Not printed.*
- No. 70.. Return to an Order of the House of the sixth day of March, 1899, for a Return giving the number of circular letters, sent from the office of the Chief Game Warden, soliciting answers to a series of questions as to shooting deer while in the water. The names, addresses, occupations or professions of those to whom such circulars were addressed. Also, shewing the amount of money received from the sale of permits to kill deer during the season of 1898. Also, shewing balance left after paying salaries of Game Wardens, all expenses of offices and all moneys paid to or on behalf of Game and Fish Commissioners during the year 1898, in so far as the information is not contained in the Report of the Department. Presented to the Legislature, 21st March, 1899. *Mr. Pyne. Not printed.*
- No. 71.. Return to an Order of the House of the sixth day of March, 1899, for a Return, giving the names, addresses, occupations or professions of all persons to whom permits were granted, during the year 1898 to collect birds, birds nests and eggs under provisions of the Act of 1889 for the protection of insectivorous and other birds. Also, of renewals and new permits which have been granted during the current year. Also, shewing number of convictions for violations of the Act during the year 1898, and specifying localities. Presented to the Legislature, 21st March, 1899. *Mr. Pyne. Not printed.*

- No. 72.. Return to an Order of the House of the sixth day of March, 1899, for a Return, shewing all fees paid to Alfred Stunden, a constable of the Town of Bracebridge, in connection with the enforcement of the Game Laws of the Province. Presented to the Legislature, 21st March, 1899. Mr. Reid (*Addington*.) *Not printed.*
- No. 73.. Report of the Clerk of Forestry for the year 1898. Presented to the Legislature, 25th March, 1899. *Printed.*
- No. 74.. Copy of Agreement between Her Majesty the Queen and the Sturgeon Falls Pulp Company, Limited. Presented to the Legislature, 25th March, 1899. *Printed.*
- No. 75.. Return shewing the Fees and Emoluments of the Registrars of Deeds of the Province for the year 1898, with which are contrasted receipts of the same nature in the years 1896 and 1897. Presented to the Legislature, 27th March, 1899. *Not printed.*
- No. 76.. Return to an Order of the House of the eighth day of March, 1899, for a Return, shewing the number of Police Magistrates in Ontario, their names, residences, dates of appointment and territory over which they have jurisdiction, and shewing as well their respective salaries. Presented to the Legislature, 27th March, 1899. Mr. Fox. *Not printed.*
- No. 77.. Return to an Order of the House of the ninth day of March, 1899, for a Return shewing the number of cases entered in the County Court of the County of Ontario for the past five years; the amount of money collected through the Sheriff during the same period and shewing as well the number of cases entered in the Division Court of the same County during the past five years, and the amount of money collected in the Court during the same period. Also, shewing the number of cases that went to trial in each Court respectively. Together with a statement of the number of cases heard or tried in the County Judges Criminal Court, the number of days in which the County Judge was engaged in revising voter's lists, in attending board of audit criminal justice accounts, the selection of jurors, and in the performance of duties under the Overhording Tenants Act and in the performance of other duties imposed upon him by law during the said period. Presented to the Legislature, 27th March, 1899. Mr. Hoyle and Attorney-General. *Not printed.*
- No. 78.. Correspondence and general information in respect of the application for grants of public money in aid of the construction of certain portions of the Central Counties Railway, the Central Ontario Railway, the Haliburton, Whitney and Mattawa Railway, the Irondale, Bancroft and Ottawa Railway, the James' Bay Railway, the Ontario, Belmont and Northern Railway, the Ontario and Rainy River Railway, and the Ontario, Hudson's Bay and Western Railway. Presented to the Legislature, 29th March, 1899. *Printed.*
- No. 79.. Report of the Secretary and Registrar of the Province for the year 1898. Presented to the Legislature, 29th March, 1899. *Printed.*

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| No. 80.. | Report on the operations of the Ontario Gold Concessions, Limited
Presented to the Legislature, 29th March, 1899. <i>Printed.</i> |
| No. 81.. | Report of the Attorney-General upon the indebtedness of the Town-
ships of Dunwich and Aldborough in respect of certain drainage
works. Presented to the Legislature, 31st March, 1899. <i>Not
printed.</i> |
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ANNUAL REPORT
OF THE
BUREAU OF INDUSTRIES
FOR THE
PROVINCE OF ONTARIO
1898.

PARTS I, II AND III—AGRICULTURAL STATISTICS.
PART IV—CHATTEL MORTGAGES.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO.



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1899.

SEVENTEENTH ANNUAL REPORT

OF THE

BUREAU OF INDUSTRIES

PARTS I, II, III, AND IV.

1898.

TO THE HONORABLE THE MINISTER OF AGRICULTURE :

SIR,—I have the honor to present herewith Parts I, II and III of the Seventeenth Annual Report of the Bureau of Industries, being the Agricultural Statistics of Ontario for the year 1898 ; also Part IV. relating to Chattel Mortgages.

I have the honor to be, Sir,

Your obedient servant,

C. O JAMES,

Secretary.

TORONTO, Oct. 12th, 1899

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PART I.

THE WEATHER.

Temperature, rainfall and sunshine, together with the character of the soil and the nature of the tillage, are the chief factors in determining the quality of crops. Seasonable temperature and timely falls of rain or snow tend to develop a generous and well matured crop, while frosts which come too early or too late, or alternate thawing and freezing in winter, a great drouth during the growing period, or a too frequent or too prolonged rainfall, may mean the failure of a crop. Sunshine also plays an important point in the proper maturing of grain and fruit. The following weather tables, therefore, are full of interesting suggestion to those who may study them.

TEMPERATURE. The following table gives the temperature from April to September inclusive—practically the growing season—at ten well distributed points in the Province, and also the average for the seventeen years, 1882-98 :

Months.	Saugeen.	Birnam.	London.	Woodstock.	Stony Creek.	Toronto.	Lindsay.	Gravenhurst.	Ottawa.	Rockliffe.	Province average.
	°	°	°	°	°	°	°	°	°	°	°
April.....	1898 .. 39.1	42.1	42.9	42.2	44.0	43.4	42.4	40.5	43.4	41.2	42.1
	1897 .. 41.1	44.3	44.7	42.7	45.3	42.8	41.4	40.7	43.1	41.2	42.7
	1882-98 39.3	43.1	44.4	42.7	43.9	41.7	40.2	39.0	40.8	37.5	41.3
May	1898 .. 52.2	55.7	56.5	54.8	56.6	55.0	56.1	55.3	57.3	55.7	55.5
	1897 .. 48.9	52.7	55.1	52.9	55.0	52.5	52.5	52.6	54.5	52.2	52.9
	1882-98 50.2	54.5	56.2	54.0	54.8	52.8	53.2	52.6	55.4	51.7	53.5
June	1898 .. 63.3	66.7	66.6	64.9	68.7	65.4	65.5	65.1	66.2	63.4	65.6
	1897 .. 55.6	61.0	64.6	61.4	64.7	61.3	59.7	59.5	62.0	59.0	60.9
	1882-98 60.6	64.9	66.5	65.1	66.6	63.7	63.9	63.5	65.6	61.8	64.2
July	1898 .. 67.4	70.6	71.4	69.0	73.6	70.5	70.2	70.4	70.6	68.0	70.2
	1897 .. 69.6	71.3	73.5	70.9	74.8	72.1	71.3	71.9	72.4	71.6	71.9
	1882-98 64.5	68.2	69.9	68.2	71.1	67.9	66.9	66.9	68.5	64.8	67.7
August. ...	1898 .. 65.7	67.4	68.4	66.8	72.6	69.7	68.1	66.4	67.5	64.4	67.7
	1897 .. 63.2	64.8	66.2	63.4	67.8	64.7	62.3	62.7	64.1	62.4	64.2
	1882-98 65.9	65.4	66.8	65.2	69.4	65.8	64.1	63.9	65.4	61.1	65.3
September	1898 .. 63.0	63.9	63.2	61.0	63.5	62.8	61.1	60.3	61.0	58.6	61.8
	1897 .. 60.9	62.9	63.3	60.5	65.7	60.8	58.1	58.4	59.4	58.4	60.8
	1882-98 57.5	60.5	60.7	59.1	62.1	59.3	57.0	57.2	57.7	53.5	58.5
Mean for six months..	1898 .. 58.4	61.1	61.5	59.8	63.2	61.0	60.6	59.7	61.0	58.5	60.5
	1897 .. 56.5	59.5	61.2	58.6	62.2	59.0	57.5	57.6	59.3	57.5	58.9
	1882-98 56.3	59.4	60.7	59.1	61.3	58.5	57.5	57.2	58.9	55.1	58.4

The mean temperature of the Province for April-September was 60.5°, being 1.6° above that of the same period in the preceding year, and 2.1° higher than the average for the seventeen years 1882-98. Stony Creek is credited with the highest mean temperature, 63.2° being reported, London coming next, while Saugeen and Rockliffe record 58.4° and 58.5° respectively. Both April and July failed to show as high a temperature as in 1897, but each of the six months experienced a higher average temperature than its own figures show for the seventeen years' term.

PRECIPITATION. The following table shows the fall of rain and snow in the winter months by districts for the years 1897-8 with the average for the seventeen years 1882-98. In studying this table remember that an inch of rain is equivalent to ten inches of snow.

Months.	West and southwest.		Northwest and north.		Centre.		East and northeast.		Province average.		
	Rain.	Snow.	Rain.	Snow.	Rain.	Snow.	Rain.	Snow.	Rain.	Snow.	
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
November..	{1897	4.31	8.5	2.06	12.9	4.05	5.5	3.19	8.8	3.40	8.9
	{1896	2.59	3.0	2.28	13.4	2.43	4.6	2.72	3.8	2.51	6.2
	{1882-97....	2.52	6.9	2.06	14.4	2.34	5.7	1.96	8.4	2.22	8.8
December ..	{1897	1.56	13.5	1.24	24.1	2.11	15.3	2.00	17.2	1.73	17.5
	{1896	0.45	9.7	0.27	14.9	0.34	8.4	0.41	5.5	0.37	9.6
	{1882-97....	1.60	13.0	1.13	20.9	1.45	11.3	1.15	14.0	1.33	14.8
January	{1898	2.11	14.4	0.70	23.3	1.98	16.1	1.10	19.1	1.47	18.2
	{1897	1.11	15.6	1.53	25.2	0.87	13.1	1.11	15.3	1.15	17.3
	{1882-98....	1.19	16.3	0.90	27.7	1.17	18.1	0.91	21.6	1.04	20.9
February ...	{1898	0.76	17.2	0.41	21.8	0.72	18.6	0.52	17.8	0.60	18.9
	{1897	1.05	7.7	0.40	21.2	1.10	10.4	1.03	16.9	0.89	14.1
	{1882-98....	1.41	12.3	0.58	21.2	1.08	14.5	0.66	18.6	0.93	16.7
March	{1898	2.81	0.6	2.55	2.9	2.22	0.3	2.10	0.1	2.42	1.0
	{1897	1.12	6.5	1.26	17.8	2.16	11.8	1.53	14.7	1.52	12.7
	{1882-98..	1.25	8.9	0.88	13.3	1.17	9.0	0.95	12.3	1.06	10.9
Totalsforfive months.	{1898	11.55	54.2	6.96	85.0	11.08	55.8	8.91	63.0	9.62	64.5
	{1897	6.32	42.5	5.74	92.5	6.90	48.3	6.80	56.2	6.44	59.9
	{1882-98....	7.97	57.4	5.55	97.5	7.21	58.6	5.63	74.9	6.58	72.1

The rainfall for the Province in the five months was unusually heavy, being 9.62 inches, compared with 6.44 inches in the preceding year, and an average of 6.59 inches for the seventeen years. The snowfall was heavier than in 1897, but lighter than the average for 1882-98. It is interesting to note, however, that this decrease is mainly due to the remarkably light snowfall in March, when only one inch descended. On the other hand, February was the only month failing to show an increase in the rainfall compared with the average of the seventeen years. The total precipitation of both rain and snow for the months named in the table was equal to 10.26 inches of rain in 1898, while the average for the seventeen years was equal to 7.31 inches of rain.

From April to September is the growing season for most of the crops, and the rainfall during that important period is presented in the following table:

Months.	West and southwest.		Northwest and north.		Centre.		East and northeast.		Province average.	
	1898	1882-98	1898.	1882-98.	1898.	1882-98.	1898.	1882-98.	1898.	1882-98
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
April	2.08	1.85	1.17	1.45	1.47	1.57	1.08	1.34	1.45	1.55
May	2.20	3.38	2.59	2.59	2.37	2.81	2.54	2.63	2.43	2.85
June	3.14	3.13	3.03	2.74	2.80	2.80	2.36	2.61	2.83	2.82
July	1.39	2.55	1.07	2.58	0.92	2.34	1.06	2.71	1.11	2.55
August ...	2.36	2.62	3.03	2.88	1.85	2.33	3.30	2.65	2.64	2.62
September.	2.94	2.58	2.66	2.92	3.07	2.34	3.09	2.35	2.94	2.55
Totals..	14.11	16.11	13.55	15.16	12.48	14.19	13.43	14.29	13.40	14.94

Three of the months show an increased rainfall compared with their respective figures for the seventeen years period, and three fall below their own record. The most noticeable feature of the table is the low figures given for July, when the rainfall reached

only 1.11 inches, compared with 2.55 inches for the seventeen years. In some localities, owing to the unevenness of distribution, practically no rain fell during July. Next to July, the month of April had the least rainfall—as, indeed, it generally has the least of any—while September and June were the wettest months of the year. The heaviest rainfall, as usual, is shown in the west and south-west district.

SUNSHINE. The amount registered for the six months, April to September inclusive, for the years 1897-8, and the average for the seventeen years 1882-98, are given in the following table. The last column gives the number of hours of possible sunshine, calculated for latitude 45°.

Months.	Woodstock.	Toronto.	Barrie.	Lindsay.	Kingston.	Province average.	Sun above horizon, lat. 45°.
	hours.	hours.	hours.	hours.	hours.	hours.	hours.
April.....	1898 215.1 1897 144.2 1882-98.. 181.0	237 8 180.3 198.6	246.8 180.0 180.1	238.6 183.4 205.0	212.5 182.9 196.8	230.2 174.2 192.3	406.4
May	1898 175.0 1897 186.4 1882-98.. 203.9	216.6 191.3 219.2	203.2 190.4 199.3	198.6 193.8 215.7	187.9 222.8 217.8	196.3 196.9 211.2	461.1
June ..	1898 199.1 1897 234.0 1882-98.. 239.7	259.9 223.3 259.5	241 6 202.7 232.9	234.1 212.5 254.7	250.9 226.7 249.1	237.1 219.8 247.2	465.7
July.....	1898 301.7 1897 253.8 1882-98.. 272.9	323.1 269.6 282.6	314.8 268.9 260.8	291.6 255.5 270.7	307.9 245.5 270.4	307 8 258.7 271.5	470.9
August	1898 221.5 1897 269.4 1882-98.. 233.9	239.2 287.6 251.3	242.1 240 3 222.2	223.8 244.8 245.4	199.5 270.0 245.3	225.2 262.4 239.6	484.5
September	1898 173.7 1897 239.1 1882-98.. 185.6	227.7 237.7 216.2	205.0 258.3 173.1	209.3 243.1 202.7	196.3 207.1 196.9	202.4 237.1 194.9	376.3
Totals for six months .	1898 1286.1 1897 1326 9 1882-98.. 1317.0	1504.3 1389.8 1427.4	1453.5 1340.6 1268.4	1396.0 1333.1 1394.2	1355.0 1355.0 1376.3	1399.0 1349 1 1356.7	2614.9

Out of a total of 2,614.9 hours of possible sunshine for the six months named in the table, an average of 1,399.0 hours were registered, being a decided increase compared with the figures of both 1887 and the seventeen years' period. July was an unusually bright month, and so, relatively, was April. May, June and August, however, fell below their average amount of sunshine for the seventeen years. At Toronto, 1,504.3 hours of sunshine were registered in the six months, of which July contributed 325 hours. Woodstock and Kingston differ from the other four stations in the table by showing a decrease in the total number of hours of sunshine reported by them compared with their respective figures for 1882-98.

SOME WEATHER NOTES. The following relating to the weather conditions of August, September and October, is taken from the November bulletin: The temperature has continued in excess of the average throughout the fall months, the period of three months, August, September and October, being over one degree warmer than the corresponding term for 1897, and three degrees in excess of the general average. It is noteworthy that since and including September, 1897, every month has had a mean temperature above the average. The extraordinary drouth of midsummer has been more than counterbalanced, so far as the volume of precipitation is concerned by the heavy

rains of October, during which month the precipitation was 4.62 inches as compared with the general average for the month of 2.44. During the three months, August-October, the precipitation amounted to 10.20 inches, over two and a half inches more than the average. The figures for the ten months, from January to October, show that the rainfall has been upwards of one inch greater than the average precipitation. The maximum temperature reached in August was exceptionally high, close upon 100° being recorded at several stations. Drouth prevailed in some counties, the rainfall in others being above the average. The early part of September was also exceedingly warm, 100° being recorded at Stony Creek and Port Hope. The frosts occurring at a later period of the month occasioned but little damage. The month of October was mild and cloudy, with an unusually heavy rainfall, and snow at some stations about the 27th. The pasture remained good until the end of the month. Frosts were but light. The first general frost took place on the 16th of October, though numerous northern or exposed localities were visited at earlier dates in the month, especially on the 6th and 7th. Some of the more southern stations did not experience any frost until dates varying from the 27th to the 30th. Singularly enough, Gravenhurst, Muskoka, was untouched until the 27th. The earliest snowfall was at Sudbury on the 13th of October, followed by heavy snow at points in Nipissing, Muskoka and Parry Sound on the 14th, and a more general precipitation on the 27th, the volume of which, however, was but small. The first considerable fall of a general character was the storm of the 10th and 11th November, the precipitation of which varied from two inches in London and seven in Toronto to eleven in Millbrook.

SEASONAL NOTES FROM HAILEYBURY, LAKE TEMISCAMINGUE.

- February 9th.—First rain.
 March 12th.—Snow going fast, some knolls bare.
 " 16th.—First crow; lightning at night.
 " 28th.—Snow nearly all gone in clearing.
 April 7th.—Last sleighing in bush.
 " 8th.—Ice getting rotten.
 " 9th.—Robins singing.
 " 22nd.—Bees put out, carrying pollen at once from the willows.
 " 24th.—First butterfly.
 " 27th.—Ice went out in afternoon.
 " 28th.—First steamer; frogs piping.
 May 4th.—Last snow.
 " 7th.—First swallow.
 " 9th.—Thunder storm.
 " 11th.—Kingfisher seen.
 " 21st.—Swallowtail butterfly.
 July 10th.—Frost reported in neighborhood.
 September 9th.—First minimum reading below 32°
 October 1st.—Slight white frost.
 " 6th.—First real frost
 " 11th.—Last thunderstorm.
 " 12th.—First snowflake.
 " 26th.—First sleighing.
 November 5th.—Snow all gone.
 " 22nd.—Last plowing.
 " 25th.—Lake frozen partly.
 December 4th.—Last trip of steamer.

FARM LANDS OF THE PROVINCE.

RURAL AREA ASSESSED. The following table gives the acreage assessed in townships which are municipally organized by county groups, the total for the Province being given for all classes of land for 1897 and 1898 :

Districts.	Acres assessed.			Acres cleared.		Acres woodland.	Acres swamp or marsh.	Percent cleared.
	Resident.	Non-resident.	Total.	1898.	1897.			
Lake Erie	2,319,286	18,931	2,338,217	1,662,650	1,609,885	583,094	92,473	71.1
Lake Huron	2,296,206	30,590	2,326,796	1,505,664	1,487,058	558,795	262,337	64.7
Georgian Bay	1,976,714	45,732	2,022,446	1,197,240	1,189,222	513,987	311,219	59.2
West Midland	3,232,793	21,776	3,254,569	2,489,486	2,466,688	465,249	299,834	76.5
Lake Ontario.....	3,001,052	49,916	3,050,968	2,402,428	2,391,149	340,168	308,372	78.7
St. Law. and Ottawa.	5,178,452	200,853	5,379,305	2,586,413	2,562,394	1,747,377	1,045,515	48.1
East Midland	2,572,593	182,191	2,754,784	932,001	929,700	1,287,116	535,667	33.8
Northern Districts ..	1,915,742	349,757	2,265,499	217,732	216,985	1,703,119	344,648	9.6
The Province. (1898..	22,492,838	899,746	23,392,584	12,993,614	.....	7,198,905	3,200,065	55.5
	1897..	22,403,060	957,368	23,360,428	.....	7,294,026	3,213,321	55.0

The rural area assessed amounts to 23,392,584 acres, or 32,156 acres more than in the preceding year, notwithstanding a considerable decrease in the number of acres of non-resident land. There are 12,993,614 acres of cleared land, which is 140,533 acres more than in 1897. There are still over seven million acres of woodland, and over three million acres of swamp or waste land in organized townships of the Province, although in both these items there has been a decrease in acreage compared with the previous year. The percentage of cleared land is now 55.5, which is .5 more than in 1897.

AREA IN PASTURE. The following table gives the number of acres in pasture by county groups and for the Province for each of the five years 1894-98, and also the percentage of cleared land in pasture in 1898 :

Year.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
	acres.	acres.	acres.	acres.	acres.	acres.	acres.	acres.	acres.
1898.....	259,173	352,411	228,373	502,082	372,563	747,009	210,407	36,025	2,708,043
1897.....	249,918	349,412	227,658	493,514	368,546	730,330	204,162	34,705	2,658,245
1896.....	247,681	356,243	182,149	505,052	383,382	706,650	204,931	33,656	2,619,744
1895.....	261,181	373,061	235,602	518,394	391,876	705,175	209,859	33,507	2,728,655
1894.....	247,530	363,178	233,935	519,802	388,225	711,042	200,979	32,550	2,703,241
Rate per 1,000 acres cleared in 1898...	155.9	234.1	190.7	201.7	155.1	288.8	225.8	165.5	208.4

There are 2,708,043 acres in pasture, or 49,798 acres more than in the preceding year, every district sharing in the increase. Out of every 1,000 acres of cleared land there are 208.4 in pasture, taking the whole Province, while the dairy counties of the St. Lawrence and Ottawa group go as high as 288.8 per 1,000.

ACREAGE UNDER CROP The following table gives the acreage under crop for each of the five years 1894-98, with the average for the seventeen years, 1882-98 :

Field crops.	1898.	1897.	1896.	1895.	1894.	1882-98.
	acres.	acres.	acres.	acres.	acres.	acres.
Fall wheat	1,048,182	950,222	876,955	743,199	778,992	900,382
Spring wheat.....	389,205	323,305	255,361	223,957	230,016	474,432
Barley	438,784	451,515	462,792	478,046	486,261	630,376
Oats	2,376,360	2,432,491	2,425,107	2,373,309	2,342,766	1,904,717
Rye	165,089	187,785	148,680	120,350	90,144	111,174
Peas	865,951	896,735	829,601	799,963	785,007	728,256
Corn.....	330,748	335,030	317,667	302,929	267,348	290,453
{ Husking	189,948	209,005	178,962	149,899	111,361	
{ Fodder	150,394	151,669	145,606	135,262	145,268	98,790
Buckwheat	45,220	50,591	68,369	72,747	59,281	37,656
Beans	169,946	169,333	178,965	184,647	167,253	169,584
Potatoes	47,923	41,175	36,101	34,383	27,670	25,074
Mangel-wurzels.....	12,418	12,025	12,333	13,002	11,186	10,849
Carrots	151,601	149,336	148,234	151,806	147,657	121,429
Turnips	2,453,503	2,341,488	2,426,711	2,537,674	2,576,943	2,383,737
Hay and Clover						
Total	8,835,272	8,701,705	8,511,444	8,321,173	8,227,153	7,876,919

The acreage under crop in the Province is given as 8,835,272, which is 133,567 more than in 1897, and it also exceeds the total area of any previous period. Hay has resumed its place in the lead, oats having fallen back to their former position as the crop with the second largest acreage. There is a decided enlargement in the areas of both fall and spring wheats, but corn, for the first time in many years, has failed to make an increase in acreage. There is nothing striking in the changes of figures given for the other crops.

The acreage of all crops mentioned in the preceding table is given in the following table, and for the same periods, by county groups and for the Province :

Year.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
	acres.	acres.	acres.	acres.	acres.	acres.	acres.	acres.	acres.
1898	1,159,025	995,640	830,307	1,723,029	1,735,248	1,601,768	620,847	169,408	8,835,272
1897	1,144,347	982,592	814,595	1,722,480	1,727,077	1,545,908	603,197	161,509	8,701,705
1896	1,097,435	946,198	792,817	1,692,840	1,707,294	1,519,090	604,692	151,078	8,511,444
1895	1,057,730	909,262	773,416	1,651,847	1,676,762	1,511,493	597,027	143,636	8,321,173
1894	1,047,297	873,424	758,184	1,594,356	1,687,718	1,529,255	596,254	140,665	8,227,153
Average 1882-98 ...	993,677	842,212	713,403	1,535,783	1,650,489	1,451,757	575,196	114,402	7,876,919

Every group of counties shows an increase in the acreage under crop, each having, also, a larger area than in any other year of the table. The Lake Ontario, West Midland and St. Lawrence and Ottawa districts still lead in the matter of acreage, in the order named.

PROPORTIONAL AREAS UNDER CROP. The relative distribution of the various crops per 1,000 acres cleared is given in the following table, by county groups

and for the Province for 1897 and 1898, together with the average for the seventeen years 1882-98 :

Districts.		Fall wheat.	Spring wheat.	Barley.	Oats.	Rye.	Peas.	Corn.	Buckwheat.	Beans.	Potatoes.	Mangel-wurzels.	Carrots.	Turnips.	Hay and clover.	Total.
Lake Erie.	1898.	154.7	3.3	22.1	130.6	10 0	36.7	107.0	9.5	20.5	10.6	2.2	.8	1.7	187.4	697.1
	1897.	146.7	2.6	21.5	139.0	16.1	37.8	112.4	10.8	23.0	11.1	2.0	.8	1.8	185.2	710.8
	'82-98	161.7	6.5	25.2	130.6	10.1	42.1	84.2	9.2	19.3	11.8	1.3	.7	1.9	201.7	706.3
Lake Huron.	1898.	107.0	6.5	31.5	193.6	3 4	79.6	26.4	3.4	1.1	8 8	4.6	.7	11.1	183 6	661.3
	1897.	98.7	7.4	28.9	199.8	4.5	83 1	29.7	2.7	1.8	9.3	4.2	.7	10.8	179.2	660.8
	'82-98	107.7	20.8	40.4	167.3	1.5	70.2	15.2	1.4	1.0	9.9	2.6	.8	11.1	194.5	644.4
Georgian Bay.	1898.	87.6	27.9	35.9	200.1	8 4	103.5	12.6	12.7	.7	12.6	2.1	.8	16.7	171.9	693.5
	1897.	76 2	29 6	37.6	205.3	9 8	106.9	15.8	10 4	.8	13.3	1.5	.6	15.8	161.4	685.0
	'82-98	75.1	54.7	47.2	177.4	3 9	87.5	5.6	3.6	.5	13.7	1.1	1.0	14.2	192.6	678.1
West Midland.	1898.	115.9	12 8	42.9	206.5	7.0	66 1	30.3	3.5	.8	11.9	6.3	.8	18.6	168.7	692.1
	1897.	105.8	16.2	42.4	212.4	10.8	69.8	34.1	3.0	1.0	12.4	5.5	1.0	19.0	164.9	698.3
	'82-98	109.5	28.0	52.8	175.8	4.0	63.0	19.2	1.6	.8	12.2	3 2	1.0	17.1	182.8	671.0
Lake Ontario.	1898.	80.9	56.7	47.3	161.6	25.8	91.6	31.9	17.3	1.0	15.5	4.6	1.0	17.8	169.3	722.3
	1897.	79.1	40.4	55.2	172.2	26.1	97.5	35.7	19.7	1.2	15.9	3.9	.9	17.6	156.9	722.3
	'82-98	71.3	60.8	100.4	143.4	15.4	78.6	19.3	14.0	1.2	14.6	2.7	1.1	15.0	181.0	718.8
St. Lawrence and Ottawa.	1898.	4.3	41.8	20.0	197.5	11.3	32.5	41.8	17.4	1.3	15.1	1.9	1.1	3.3	230.0	619.3
	1897.	3.0	34.4	19.1	198.1	11.7	32.9	39.8	16.7	1.3	14.0	1.6	1.1	3.1	225.5	603.3
	'82-98	5.9	46.3	32.7	182.3	12.4	38.6	19.3	14.1	1.5	16.6	1.0	.8	2.3	256.8	630.6
East Midland.	1898.	30.9	62.5	38 8	184.2	24.8	78.2	27.6	18.7	.9	13.9	3.0	1.2	12.2	169.2	666.1
	1897.	19.0	46.8	43.8	194.6	25.1	81.7	29.4	20.5	1.0	13.4	2.7	1.2	12.0	157.6	648.8
	'82-98	29.3	74.8	75.5	163.4	20.2	70.7	15.2	13.0	1.0	14.7	2.1	1.1	9.1	193.2	683.3
Northern Districts.	1898.	9.9	28.3	15.0	199.5	6.3	90.4	8.9	6.9	1.3	24.2	1.1	2.1	15.1	369.0	778.0
	1897.	6.6	23.1	14.2	199.0	5.5	90.5	7.3	5.3	.9	22.7	1.1	2.1	15.8	350.2	744.3
	'82-98	5.1	49.1	15.2	177.9	6.1	82.0	4.3	5.2	.8	24.4	.8	1.6	16.6	368.2	757.3
The Province.	1898.	80.7	30.0	33.8	182.9	12.7	66.6	40.1	11.5	3.4	13.1	3.7	1.0	11.7	188.8	680.0
	1897.	73.9	25.2	35.1	189.3	14.6	69.8	42.3	11 8	3.9	13.2	3.2	.9	11.6	182.2	677.0
	'82-98	77.3	40.7	54.1	163.6	9.6	62.5	25.0	8 5	3.2	13.7	2.2	.9	10.4	204.7	676.4

Out of every 1,000 acres cleared there are 680 acres given to the crops comprising the table, a net increase of three acres compared with the previous year.

FALL WHEAT.

The 1897 November bulletin had the following regarding the new fall wheat : Preparations were made early in the season for a greatly increased acreage of fall wheat but the drouth prevailing at seed time upset many calculations, seeding in some cases being delayed until too late. Reports, however, would indicate that an increased area has been sown to fall wheat in the western half of the Province, where the bulk of the crop is raised, and that the usual acreage will be grown further east. Reports vary as to the present condition of the crop, as seeding took place during a period extending from the latter part of August to the middle of October. Where sown on fallowed or early plowed land the crop is spoken of as in excellent condition, while that put in on pea ground almost invariably found an inhospitable bed. Only three correspondents speak of Hessian Fly, while many positively claim entire exemption from all insect pests for the growing crop of fall wheat. Forty-five favorite varieties are named. Dawson's Golden Chaff and Clawson are away in the lead, Manchester, Genessee Giant, Democrat, Surprise and Michigan Amber come next, and the remainder are scattering.

The following reference to fall wheat was contained in the May bulletin: "November reports led to the conclusion that the area of fall wheat had been increased, especially in the western part of the Province, and that there would have been still more but for the delay caused to seeding by the drouth of September and the latter part of August. Reports from correspondents just to hand are to the effect that in most cases the crop came out in the spring in about the same condition as it entered the winter. There was some mention of a little heaving, of smothering, and of slight injury from frost, but these were exceptional. Little harm appears to have been done by insects, wire-worms being reported in a few cases. The first two weeks of April were far from favorable for the crop, and although rains later helped the plant it is hardly in as forward a condition as usual. Where sown early on summer fallow, fall wheat has never been more promising, but many fields were hastily prepared owing to the rise in the price of wheat, and this, with the drouth prevailing at the time of seeding, gives the fields a patchy and weak look in many quarters. In several of the western and central counties some plowing up has been done, but not to any considerable extent. The present acreage of the crop, therefore, may be set down as quite up to the average, and the average condition in the first week of May as fair. The outcome of the crop of course depends upon the weather of the next six weeks."

The August reports were thus summarized: "The crop of fall wheat is one of the best ever harvested in the Province. Both east and west the yields have been large, an occasional low yield being more than balanced by a heavy return close by. The crop was cut early, and was harvested in a good condition generally, although a few correspondents complain of 'lodging' owing to the heavy straw, and of 'shelling.' The grain is described as being plump, and in many cases goes considerably over standard weight. Occasional reports of rust were received, but little complaint was made regarding insects except in the case of the midge, which was injurious in Welland, Haldimand and Lincoln, particularly in the last named county."

The November bulletin said: "The favorable accounts in the returns given in August have been verified by the reports just to hand. Poor yields were exceptional, and large yields were common. The plumpness of the grain is frequently alluded to, in many cases the weight going over the standard, and as high sometimes as sixty-three or sixty-four pounds to the bushel. Here and there only did correspondents complain of rust, midge, or other injury to the crop. The yield is twenty-four bushels per acre, giving the large total yield of 25,158,713 bushels."

The following table gives the acreage and yield of fall wheat by county groups and for the Province for 1897 and 1898, together with the average for the Province for the seventeen years 1882-98:

Districts.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.
Lake Erie	257,211	5,751,213	22.4	236,206	5,554,377	23.5	227,522	4,357,184	19.2
Lake Huron	161,156	3,946,205	24.5	146,698	3,639,365	24.8	140,717	2,888,173	20.5
Georgian Bay	104,935	2,729,405	26.0	90,621	2,300,263	25.4	78,958	1,700,631	21.5
West Midland	283,553	7,062,616	24.5	260,983	7,167,780	27.5	250,458	5,326,103	21.3
Lake Ontario	194,301	4,612,597	23.7	189,046	4,915,057	26.0	163,776	3,416,223	20.9
St. Lawrence and Ottawa	11,102	271,139	24.4	7,555	114,851	15.2	13,494	252,253	18.7
East Midland	28,767	731,458	25.4	17,671	273,381	15.5	24,683	485,774	19.7
Northern Districts	2,156	54,080	25.1	1,442	22,969	15.9	774	16,170	20.9
The Province	1,048,182	25,158,713	24.0	950,222	23,988,051	25.2	900,382	18,442,511	20.5

The yield per acre for the Province in 1898 is 24 bushels, or 3.5 bushels more than the average for the seventeen years, although falling short by 1.2 bushels of the average for 1897. The increase in the area, however, brings the total yield for the year up to 25,158,713 bushels, or 1,170,662 bushels more than in the preceding year. The large total yield of the West Midland group, however, and the splendid average yield of 26 bushels per acre returned for the Georgian Bay district, are interesting features of the table, although the remarkable yield of the West Midland group in the preceding year is not equalled by either.

SPRING WHEAT.

The outlook for the crop was thus described in the bulletin issued in August: "Many correspondents in the eastern portion of the Province report a considerable increase in the acreage devoted to spring wheat. This crop, like other cereals, ripened early owing to the hot weather, which in some neighborhoods prevented the heads from filling well. The yield as a whole, however, will be considerably above the average, especially in eastern Ontario, where a number of correspondents speak of the crop as the best for many years. The main drawbacks experienced have been frost and drouth, and some slight injury from rust and midge is also reported."

The November bulletin thus referred to the crop: "The acreage of spring wheat is only a little over one-third of that of fall wheat. The crop has been over an average in yield, and the quality is also good. A large amount of Goose wheat has been grown. The yield is a little larger than our August estimate, being 17.7 bushels per acre."

The acreage and yield, by county groups and for the Province, are given in the following table:

Districts.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.
Lake Erie.....	5,492	82,104	14.9	4,167	58,126	13.9	9,181	131,334	14.3
Lake Huron.....	9,737	165,732	17.0	11,043	152,842	13.8	27,237	386,262	14.2
Georgian Bay.....	33,434	533,606	16.0	35,160	497,826	14.2	57,582	841,187	14.6
West Midland.....	31,864	494,166	15.5	39,916	458,337	11.5	63,940	957,459	15.0
Lake Ontario.....	136,153	2,277,019	16.7	96,478	1,647,867	17.1	139,578	2,160,487	15.5
St. Lawrence and Ottawa..	108,164	2,210,201	20.4	88,054	1,324,566	15.1	106,571	1,760,418	16.5
East Midland.....	58,198	1,000,226	17.2	43,475	650,260	15.0	62,926	893,824	14.2
Northern Districts.....	6,163	110,731	18.0	5,012	74,277	14.8	7,417	128,326	17.3
The Province.....	389,205	6,873,785	17.7	323,305	4,868,101	15.1	474,432	7,259,297	15.3

The average yield of spring wheat for the Province is 17.7 bushels per acre, being 2.4 bushels more than that of the seventeen years, and 2.6 more than the average yield of 1897. This, with the increased acreage, makes the total yield for the Province 6,873,785 bushels, or over two million bushels more than in the preceding year. The largest areas of spring wheat are found in the Lake Ontario and St. Lawrence and Ottawa counties, and the latter group this year has the high average yield of 20.4 bushels per acre. The Lake Erie district has the smallest acreage and the lowest average yield for the year.

BARLEY.

The August bulletin said of barley: "The crop is generally good, and with a few exceptions the grain is bright and in fine condition, though in some places light in weight owing to the heat and lack of moisture. The frost in July also inflicted some damage on the crop. Slight losses from smut and rust have been observed, but there appears to have been a marked exemption from the ravages of destructive insects."

The crop was thus described in the November bulletin: "Only the low prices prevailing prevented barley from being one of the most satisfactory crops of the season. The yield per acre generally has been large, and a better sample of grain as to weight and color has seldom been raised. The yield is 28.9 bushels per acre, somewhat larger than was estimated before the crop was harvested."

The acreage and yield, by county groups and for the Province, are given in the following table:

Districts.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.
Lake Erie	36,760	1,092,533	29.7	34,603	890,600	25.7	35,389	877,864	24.8
Lake Huron	47,374	1,470,901	31.0	42,884	1,161,050	27.1	52,864	1,415,772	26.8
Georgian Bay	43,032	1,192,703	27.7	44,718	1,191,811	26.7	49,663	1,289,556	26.0
West Midland	106,819	3,258,029	30.5	104,542	2,874,139	27.5	120,759	3,377,322	28.0
Lake Ontario	113,641	3,181,602	28.0	131,939	3,598,729	27.3	230,515	5,881,957	25.5
St. Lawrence and Ottawa ..	51,712	1,423,042	27.5	49,020	1,237,831	25.3	75,369	1,824,468	24.2
East Midland	36,172	964,464	26.7	40,732	997,301	24.5	63,526	1,515,018	23.8
Northern Districts	3,274	80,394	24.6	3,077	70,318	22.9	2,291	53,338	23.3
The Province	438,784	12,663,668	28.9	451,515	12,021,779	26.6	630,376	16,235,295	25.8

There is a decrease in the acreage of barley compared with both the preceding year and the average for the seventeen years. The large average yield of 28.9 bushels per acre, however, enables the total yield of the Province to exceed that of 1897 by 641,889 bushels. The Lake Ontario group continues to lead in the area given to barley. In the Lake Huron district the average yield per acre was 31 bushels.

OATS.

The following was contained in the August bulletin: "There will be about an average yield of oats as regards quantity, the crop, which promised splendidly during the earlier part of the season, having suffered considerably from the late frosts, and to a still greater degree from the hot, dry weather, which caused premature ripening. The straw is consequently short, and the grain apt to be light. The yield is better in the extreme eastern counties, both in quantity and quality, than elsewhere. In a number of localities injuries from rust and the attacks of grasshoppers are mentioned, but smut seems to have almost entirely disappeared, being mentioned by only one correspondent."

The November bulletin said of oats: "This crop appears to be a fair one, in many cases going over the yield per measured bushel, although complaints are made in various sections as to the grain being rather light in weight, on account of quick ripening. A few correspondents complained of rust, and grasshoppers did considerable injury in some of the Lake Erie counties. The crop has turned out two bushels per acre better than was estimated before harvest, bringing the yield up to the extraordinary total of 86,858,293 bushels."

The following table shows the acreage and yield by county groups and for the Province :

Districts.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.
Lake Erie	217,088	7,816,522	36.0	223,704	7,329,360	32.8	183,776	6,332,673	34.5
Lake Huron	291,448	11,362,217	39.0	297,168	11,033,382	37.1	218,674	7,814,584	35.7
Georgian Bay	239,596	8,328,302	34.8	214,134	8,722,030	35.7	186,570	6,264,901	33.6
West Midland	514,053	20,412,418	39.7	523,972	20,352,945	38.8	402,279	15,126,954	37.6
Lake Ontario	388,307	13,968,525	36.0	411,725	15,028,423	36.5	329,230	11,632,920	35.3
St. Lawrence and Ottawa ..	510,775	18,302,739	35.8	507,672	16,774,058	33.0	419,710	13,549,101	32.3
East Midland	171,650	5,426,477	31.6	180,938	5,823,213	32.2	137,570	4,261,093	31.0
Northern Districts	43,443	1,241,093	28.6	43,178	1,254,717	29.1	26,878	810,427	30.2
The Province	2,376,360	86,858,293	36.6	2,432,491	86,318,128	35.5	1,904,717	65,792,653	34.5

The acreage of oats exceeds that of any of the other field crops excepting hay (which it exceeded in the preceding year), but it has fallen off considerably compared with 1897. The average yield of 36.6 bushels per acre for the Province, however,—which is 1.1 bushel above that of the preceding year, and 2.1 more than the average for the seventeen years—makes the total yield 540,165 bushels more than in 1897. The West Midland appears to be the banner district for both acreage and yield of oats, judging by the three records given in the table.

RYE.

The greater part of this crop is fed green, to supplement pasture, and the results this season have been satisfactory. The August bulletin said that where grown for the grain the yield per acre would be slightly above the average, except in the Lake Ontario counties, in some of which there was a small yield.

Correspondents had but little to say regarding this crop in their November reports. What little rye was grown for grain turned out well. In fact the too rank growth of the crop seems to have been the chief cause for complaint.

The following table gives the acreage and yield of rye by county groups and for the Province :

Districts.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.
Lake Erie	16,703	244,807	14.7	25,890	446,011	17.2	14,166	216,437	15.3
Lake Huron	5,140	96,243	18.7	6,682	138,880	20.8	1,896	34,651	18.3
Georgian Bay	9,999	163,155	16.3	11,621	208,766	18.0	4,091	70,643	17.3
West Midland	17,505	324,364	18.5	26,679	549,030	20.6	9,205	162,198	17.6
Lake Ontario	61,917	953,074	15.4	62,419	1,120,001	17.9	35,369	532,716	15.1
St. Lawrence and Ottawa ..	29,321	501,815	17.1	29,954	496,018	16.6	28,506	497,757	17.5
East Midland	23,137	363,551	15.7	23,346	402,113	17.2	17,027	264,408	15.5
Northern Districts	1,367	26,225	19.2	1,194	21,186	17.7	914	17,203	18.8
The Province	165,089	2,673,234	16.2	187,735	3,382,005	18.0	111,174	1,796,013	16.2

The yield per acre for the Province is an average one, although less than that of the preceding year by 1.8 bushels. This, with the decrease in the area, makes the falling off in the total yield 708,771 bushels compared with 1897. The figures given for yield, however, are more or less conventional, as much of the rye raised in the Province is grown for green feed.

PEAS.

According to the August reports the yield of peas varied greatly, even in the same county or township. The crop got a good start, but the continued drouth checked the growth, and caused the vines to ripen too early. The frost of July 10th also did considerable injury to this crop. The straw though short was bright, and will make good fodder. The "bug" was frequently complained of in the Lake Erie district, but further east it did not appear to give much trouble. The yield per acre for the Province fell short of the average, and ran all the way from ten to thirty bushels to the acre.

The November returns were not favorable concerning peas, as will be seen from the following summary given in the bulletin: "This appears to have been the most unfortunate of the grain crops. The drouth of the early part of the summer, and a frost about the 10th of July, told upon the growth, and the 'bug' made its appearance in nearly every section of the Province. Some of those reporting are inclined to take a discouraging view of the outlook for pea growing owing to this pest. A few correspondents speak of a good crop, but many report the opposite. The crop continued to drop in yield, so that the final statement gives 13,521,263 bushels, somewhat under the previous year, and 15.6 bushels per acre, as compared with 19.6 bushels per acre, the average for the period."

The acreage and yield, by county groups and for the Province, are given in the following table:

Districts.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Per acre	Acres.	Bushels.	Per acre	Acres.	Bushels.	Per acre
Lake Erie.....	60,937	866,398	14.2	60,940	734,043	12.0	59,238	1,013,153	17.1
Lake Huron.....	119,852	2,151,521	18.0	123,526	1,990,138	16.1	91,810	1,956,263	21.3
Georgian Bay.....	123,854	1,955,156	15.8	127,098	1,886,720	14.8	92,073	1,897,077	20.6
West Midland.....	164,638	2,560,179	15.6	172,146	2,479,686	14.4	144,050	2,909,900	20.2
Lake Ontario.....	220,170	3,256,473	14.8	233,169	3,763,382	16.1	180,400	3,424,976	19.0
St. Lawrence and Ottawa.	83,914	1,461,099	17.4	84,264	1,448,798	17.2	88,805	1,688,714	19.0
East Midland.....	72,911	974,847	13.4	75,958	1,205,921	15.9	59,489	1,091,219	18.3
Northern Districts.....	19,675	295,590	15.0	19,634	358,405	18.3	12,391	267,078	21.6
The Province.....	865,951	13,521,263	15.6	896,735	13,867,693	15.5	728,256	14,248,380	19.6

The acreage of peas is less than in 1897, and the total yield also falls below the figures for that year. The average yield per acre is only 15.6 bushels, being but .1 bushel above the low yield of the preceding year, and exactly four bushels less than the average for the seventeen years. Not a single group in 1898 reached the average yield per acre of the Province for the seventeen years, while the East Midland group had only 13.4 bushels per acre. The Lake Ontario counties have the largest area in peas.

REMARKS OF CORRESPONDENTS.

(FROM THE AUGUST RETURNS.)

Colchester N., Essex : I have heard of some fall wheat having been threshed, weighing from 62 to 64 lbs. per bushel.

Gosfield N., Essex : Peas are a fine crop where grown. The farmers just turn their hogs in to fatten on them, and do not harvest the crop.

Malden, Essex : Peas are not a success on account of the bugs, which are very bad.

Mersea, Essex : Many are cutting the oats before ripening on account of the grasshoppers, which are literally swarming by the millions.

Harwich, Kent : There is more barley grown than for years. Farmers are growing it to grind for hogs instead of peas, as the bugs are so bad in the latter.

Orford, Kent : Wheat has been a splendid crop. It is a first-class sample, and has been harvested in first-class order.

Raleigh, Kent : We know of one field of Dawson's Golden Chaff which threshed out 46½ bushels per acre.

Yarmouth, Elgin : The date of harvesting oats here, was from the 22nd to 30th of July. It was never known to be earlier in this township.

Townsend, Norfolk : There was no rain from July 1st to the 26th, when we had a good heavy shower. Crops are about all secured.

Thorold, Welland : The midge has again appeared, but not to a great extent.

Bertie, Welland : Some fields of fall wheat have been threshed, yielding 40 bushels to the acre.

Bosanquet, Lambton : The bug is the main drawback to raising peas here. Farmers are sowing them late, which avoids injury from this insect to a certain extent.

Sarnia, Lambton : We have had but one shower in about a month. Hay and fall wheat were saved in prime condition. A good deal of the wheat has been already threshed, and I hear of some testing from 62 to 65 lbs. to the bushel.

Goderich, Huron : Grain of all kinds is really the brightest and cleanest we have had for a number of years. There is scarcely any rust to be seen, and we shall have clean threshing this year.

Howick, Huron : I have never seen the oat crop freer from rust. The straw is clean and bright. Peas were much injured by frost on July 10th.

Tuckersmith, Huron : Crops are very irregular, which will apply to all kinds of grain crops this year.

Amabel, Bruce : Fall wheat is the best crop in twenty years, with few exceptions in places where it has been winter-killed. Early sown oats as a rule are a heavy and well filled crop, while late sown are dried and shrivelled up.

Greenock, Bruce : The pea weevil seems not so bad as last year. Pods are plentiful, but short and not well filled.

Kinloss, Bruce : Late sown wheat was very thin and a partial failure. Early sown was splendid.

Bentinck, Grey : Oats promised to be an enormous crop before the drouth set in, but while straw is abundant, the grain is very light.

Bentinck, Grey : The fall wheat crop was perhaps, the best ever harvested in this part of the Province, and it has been housed in the best condition. Many fields will average fully forty bushels an acre, but a portion of the crop was sown on land not suitably prepared, on which the yield was not large, which brings the general average much lower than it should be.

Glenelg, Grey : Oats ripened too quickly on account of drouth and heat. The grain will probably be light in weight, and late oats short in straw. It is difficult to estimate returns.

Sullivan, Grey : The drouth has hastened maturing. The crop will not be so heavy as appearance indicated three weeks ago.

Medonte, Simcoe : Some fields of peas have been completely killed by the drouth, and have not a filled pod in them.

Orillia, Simcoe : On some farms they will have forty bushels to the acre. I never saw fall wheat so good for years. The straw is yellow and the grain plump.

London, Middlesex : Grain ripened a little too quickly owing to drouth and heat. The berry is not so large as usual.

Westminster, Middlesex : The demand for hogs has stimulated the growing of peas, and it is far superior to corn for quality and earliness.

Blenheim, Oxford : Late peas are not worth cutting, and many fields are being plowed down or fed to cattle.

Zorra W., Oxford : The best of the fall wheat lodged. The poorer had some rust. On the whole it is a fair crop, although the sample is not so good as last year.

Elma, Perth : Early sowing appears to insure the best and heaviest crops of fall wheat in this township.

- Logan, Perth : Early peas suffered much from frost ; on mucky land they were almost ruined.
- Garafraxa, Wellington : A severe frost in the early part of July did serious damage on some farms. Tender vegetables were totally destroyed, and in many cases barley, oats and peas were injured.
- Mulmur, Dufferin : Drouth and frost have done more or less injury to grain crops on some farms.
- Clinton, Lincoln : The midge has hurt the fall wheat quite a bit. Oats ripened too fast on account of the dry weather.
- Barton, Wentworth : A great many grass peas were grown this year.
- Esqueping, Halton : The pea crop never looked better up to the time of blossoming. Since then heat and drouth caused them to ripen too soon, and the grain is small.
- Albion, Peel : Peas are very small, and a great many pods have nothing in them.
- Markham, York : The harvest is nearly finished. It is the earliest and quickest on record. Peas are somewhat shrunken from premature ripening.
- Vaughan, York : There are some good fields of peas and others are very poor. Some think the frost hurt them, but I think it was the heat. They bloomed well and then wilted.
- Scott, Ontario : The best crop of fall wheat in twenty-five years. Threshing has been general since the 23rd of July.
- Darlington, Durham : Large quantities of peas were injured last year for seed by sprouting. Not enough allowance was made for this in sowing, which caused a thin crop in many places.
- Athol, Prince Edward : Some early varieties of peas are good, but late ones are very poor, having dried up.
- Crosby N., Leeds : All the grain crops are the best for a number of years, except peas, which will be only a fair yield.
- Osgoode, Carleton : Owing to the rise in the price of wheat there has been double the quantity sown this year—spring wheat only being grown.
- Fitzroy, Carleton : Grain crops in this township look exceedingly well. They are well filled in head, and free from rust and blight.
- Lanark, Lanark : Late sown wheat did not do very well, which brings down the average.
- Monaghan N., Peterborough : Early peas are good, but late ones are small, having ripened too soon on account of the drouth.
- Monmouth, Haliburton : Frosts on the 10th and 11th of July did much damage to the grain crops, and the hot, dry weather almost finished the rest.
- Huntingdon, Hastings : I saw six acres of peas threshed. There was an abundance of straw, but only 25 bushels of grain.
- Sidney, Hastings : Early sown spring wheat was a good crop, and looked splendid ; late sown, however, is shrunk and will be almost useless for flour. The straw of both kinds is bright, and will be good for feed.
- Monck, Muskoka : There was enough spring wheat to carry 20 bushels to the acre, but the crop was in many places hurt by the frost, and there will be only about two-thirds an average yield. Some will have a half yield of peas, while others are curing the crop for fodder or are feeding it green.
- Perry, Parry Sound : The frost on the 11th July and the dry hot weather is having a disastrous effect on all grain crops, and it is impossible to give a fair estimate of yield. Rain is badly needed. Only a little over two-thirds of an inch of rain fell here during the month of July.
- Lash, Rainy River District : On the 11th of July we suffered damage from a heavy hail storm which lasted fifteen minutes. It is the first we have met with here.

CORN.

The August bulletin had the following concerning corn : " This promises to be a fair crop in the Lake Erie counties, but in the other districts much injury has been done by the frost of the second week of July. The drouth has also told against the crop in every section of the Province. Several Middlesex correspondents refer to the large numbers of crows and blackbirds having attacked the young corn."

Corn was thus alluded to in the November bulletin : " In the more western counties of the Lake Erie group the crop was an excellent one, but from the remainder of the Province variable reports come, some describing the crop as being a good one, while neighboring correspondents report the yield and general condition as poor. Drouth and an attack of frost in July wrought considerable injury. The crop, however, turned out better than was expected earlier in the season."

The following table gives the acreage and yield of corn, by classes, for 1897 and 1898, and the total area for both years and for 1882-98 :

Districts.	For husking.			For silo and fodder.			Total area.		
	Acres.	Bushels (in the ear).	Bushels per acre.	Acres.	Tons (green.)	Tons per acre.	1898 acres.	1897 acres.	Average 1882-98 acres.
Lake Erie { 1898	163,810	13,317,484	81.3	14,060	113,611	8.08	177,870	180,879	118,488
{ 1897	162,429	12,589,798	77.5	18,450	161,215	8.74			
Lake Huron { 1898	22,890	1,619,059	70.7	16,892	186,998	11.07	39,782	44,214	19,898
{ 1897	23,891	1,562,962	65.4	20,323	251,836	12.39			
Georgian Bay.... { 1898	3,849	161,488	42.0	11,195	122,343	10.93	15,044	18,753	5,896
{ 1897	4,155	213,595	51.4	14,598	197,216	13.51			
West Midland .. { 1898	41,732	2,982,093	71.5	33,705	386,272	11.46	75,437	83,985	43,864
{ 1897	45,043	3,381,441	75.1	38,942	494,361	12.69			
Lake Ontario.... { 1898	38,251	2,025,864	53.0	38,411	383,858	9.99	76,662	85,331	44,332
{ 1897	40,865	2,877,823	70.4	44,466	556,619	12.52			
St. Lawrence and { 1898	47,891	2,713,298	57.3	60,332	773,224	12.82	108,223	101,942	44,504
Ottawa { 1897	45,538	3,265,976	71.7	56,404	804,814	14.27			
East Midland.... { 1898	11,471	562,060	49.0	14,277	149,091	10.44	25,748	27,347	12,823
{ 1897	12,423	742,243	59.7	14,924	193,001	12.93			
Northern Districts { 1898	854	31,247	36.6	1,076	12,676	11.78	1,930	1,584	643
{ 1897	686	50,160	44.0	898	10,760	11.98			
The Province. { 1898...	330,748	23,442,593	70.9	189,948	2,128,073	11.20	520,696	544,035	290,453
{ 1897...	335,030	24,663,998	73.6	209,005	2,669,822	12.77			
{ 1892-98	278,926	19,796,524	71.0	146,635	1,652,932	11.27			

There has been a decrease in the acreage of corn both for husking and for the silo and fodder, especially in the case of the latter. The average yields per acre of both classes of corn is almost an average. Corn for husking has its greatest area and highest yield in the Lake Erie counties, while corn for the silo and fodder is most largely cultivated in the St. Lawrence and Ottawa group, where it also is credited with the best average yield.

FROM THE MAY RETURNS.

Malahide, Elgin : There were a few new silos built last year, and this winter's feeding has well satisfied the owners as to their utility. The cows especially have come through looking fine where they were fed on ensilage.

Stanley, Huron : There has been a considerable amount of corn used during the winter, and with good results. Several new silos were built last summer, and the likelihood is that some more will be built this summer.

Downie, Perth : The use of ensilage and roots is becoming more universal every year. Nearly every one has a silo, or is preparing to build one.

Mara, Ontario : Several farmers here have silos which they fill in the autumn season with corn, which is the principal feed during winter.

Drummond, Lanark : Corn growing for cattle feeding is carried on by nearly every farmer in the township. Silos are gradually gaining in favor.

Eldon, Victoria : Farmers are giving more attention to cattle fattening and hog raising. We have a fine silo recently built in our township, and more are to be erected.

FROM THE AUGUST RETURNS.

Harwich, Kent : Grain harvest came on before farmers were through cultivating corn, and much of the corn had to be neglected and is weedy. Where well tilled it will be good.

Colborne, Huron : Frost on the 10th of July cut corn on low land badly. Drouth has since retarded it, so it will be late and short.

Bentinck, Grey : There was considerable damage by frost on July 11th, but it is now growing rapidly, and promises to be an average crop.

Elma, Perth : Frost on the 10th of July did serious injury to corn and other crops. The flow of milk will not reach the average for lack of corn fodder.

Hamilton, Northumberland : Corn started well, but the drouth seems to have spoiled it.

Denbigh, Lennox and Addington : Some corn was slightly injured and some fields were entirely killed by frost.

Storrington, Frontenac : July frost hurt the corn in many places, and it is the poorest crop of the season.

Leeds and Lansdowne, Leeds : It has been too dry for a first-class crop of corn. There has not been as much grown as last year.

Osgoode, Carleton : Grubs destroyed acres of corn, and a number of fields have been plowed up and sown with buckwheat.

Drummond, Lanark : Some complain of poor seed, and with good cause, as I had some of the dwindling stuff, to my sorrow.

Otonabee, Peterborough : Fodder corn is in poor condition except upon rich soil. On low land the leaves were frosted but they are reviving some, and will do all right if we had rain.

Monmouth, Haliburton : Corn is good where not injured by frost. The frost cut some of it to the ground.

Brunel, Muskoka : Corn suffered severely from frost. I have lived in Brunel twenty-eight years, and this is the first season that frost took everything from me.

Campbell and Carnarvon, Algoma : Corn is grown by only two men in this neighborhood. One has enlarged his silo and has a good crop.

FROM THE NOVEMBER RETURNS.

Gosfield S., Essex : There is only one silo in the township that I am aware of.

Harwich, Kent : There are very few silos in this locality.

Raleigh, Kent : I know of only two silos in this district.

Yarmouth, Elgin : There are very few silos in this section.

Charlottetown, Norfolk : I know of only one silo hereabouts.

Walsingham S., Norfolk : Ensilage is getting into the background.

Windham, Norfolk : Ensilage is not much in favor around here, although those who have built silos appear to be satisfied with them.

Sherbrooke, Haldimand : Ensilage corn is raised for summer feeding, and dried for winter feeding to some extent, but we have no silos yet.

Moulton, Haldimand : Silos have not come into favor, especially as hay has been so good and cheap.

Walpoie, Haldimand : Three new silos went up in the neighborhood this summer.

Bosanquet, Lambton : There are a few silos in this township.

Warwick, Lambton : Silos are not thought much of here.

Ashfield, Huron : Ensilage is known in practice in this township.

Colborne, Huron : There have been several silos built this year, and the corn was good.

Grey, Huron : Silos are scarce in this part of the county. The one nearest me is empty.

Morris, Huron : There is not a silo on this side of the township that I know of.

Stephen, Huron : The practice of ensilage has not been adopted.

Wawanosh W., Huron : There have been three new silos erected this fall. [Corn is the only crop grown for the silo.

Arran, Bruce : Every season farmers are putting up some silos.

Brant, Bruce : The silo has come to stay.

Bruce, Bruce : Ensilage has been adopted more than usual this year.

Greenock, Bruce : Farmers are very chary about building silos. They do not seem to be satisfied with experiments.

Kinloss, Bruce : Ensilage has been adopted here to quite an extent this season.

Bentinck, Grey : There are no silos in this locality.

Sydenham, Grey : There are not many silos here.

Innisfil, Simcoe : There is only one silo in the township.

Medonte, Simcoe : Ensilage is being more generally used.

Vespra, Simcoe : Ensilage is being adopted very slowly here, but will eventually become almost the main dependence for cattle feed.

Caradoc, Middlesex : Ensilage has not been grown in this township to any extent.

Ekfrid, Middlesex : There are very few silos in this locality.

Williams E., Middlesex : The silo is steadily coming into favor.

Brantford, Oxford : Ensilage is not increasing much. There is more corn in the shock than in any other form.

Oxford E., Oxford : There are a number of silos in this township.

Zorra E., Oxford : No new silos have been put in this season in this locality.

Zorra W., Oxford : Several new silos have been built this season.

Dumfries S., Brant : A few silos have been built this year.

Garafraxa W., Wellington : Ensilage is not common, very few having a silo.

Waterloo, Waterloo : There are only a few silos in this section, but those who have them speak well of them.

Woolwich, Waterloo : Ensilage has not been adopted to any great extent ; only one new silo has been built this season.

Grantham, Lincoln : There are but few silos in this township.

Beverly, Wentworth : Ensilage is used to a moderate extent.

Esqueving, Halton : Silos are coming gradually into favor.

Nassagaweya, Halton : Silos have not been adopted to any great extent.

Toronto Gore, Peel : Ensilage has not been adopted to any great extent.

Etobicoke, York : Nearly every farm has a silo.

Scarborough, York : A number of silos have been put up and filled with corn.

Vaughan, York : There are hardly any silos in this township.

York, York : Nearly all large farms have adopted the ensilage system.

Scugog, Ontario : There is only one silo in the township.

Cartwright, Durham : Several new silos have been built.

Clarke, Durham : The silo has not made very much progress here.

Haldimand, Northumberland : Every year adds to the number of silos.

Hamilton, Northumberland : Every year sees a few silos built, although they cannot be said to be general.

Percy, Northumberland : A number of farmers here have silos.

Athol, Prince Edward : A few silos have been built.

Hallowell, Prince Edward : Silos seem to have lost their grip here.

Marysburg N., Prince Edward : There is only one silo in this township.

Marysburg S., Prince Edward : Ensilage has not been adopted this year as much as in former years.

Richmond, Lennox : The practice of ensilage is waning. There is a marked falling off in the amount of corn grown.

Pittsburg, Frontenac : Very little corn is prepared in the way of ensilage.

Storrington, Frontenac : All the best farmers here have silos.

Bastard, Leeds : About one-tenth of the farmers here have silos.

Crosby N., Leeds : A few have built silos, and like them.

Elizabethtown, Leeds : Ensilage has been considerably adopted.

Williamsburg, Dundas : The practice of ensilage is coming more into vogue.

Matilda, Dundas : A number of farmers have built stave silos.

Kenyon, Glengarry : Silos are very much used.

Caledonia, Prescott : Corn is grown in large quantities, but only a small quantity for the silo.

Hawkesbury E., Prescott : There are but few silos in this township.

Hawkesbury W., Prescott : Ensilage is used to a great extent. The crop generally grown is corn, planted in drills three feet apart, cut when nearly ripe and cut up immediately, and deposited in the silo.

Cumberland, Russell : There are a few silos in this neighborhood. Corn has not been as good a crop as it was last year.

Gower N., Carleton : I know of no new silos having been erected this year.

Horton, Renfrew : A good many silos have been built this year and a large area of corn sown.

McNab, Renfrew : There are very few silos in this township.

Bathurst, Lanark : Silos are growing in favor in this section.

Dalhousie, Lanark : There are only two silos in the township, and ensilage corn has been good.

Drummond, Lanark : Silos are being built every year. Corn is the only crop used. Almost every known variety is used.

Eldon, Victoria: I know of no silo in this township.

Laxton, Victoria: One silo has been erected in this township.

Verulam, Victoria: There are a few silos. Corn is the only crop grown for ensilage, and it was fair.

Harvey, Peterborough: No corn is grown for the silo here. The farmers raise fodder corn, however, and dry it in the stook.

Otonabee, Peterborough: There is only one silo in this township.

Monmouth, Haliburton. Some ensilage corn has been grown here, and it has done well, but there is not a silo in the township.

Huntingdon, Hastings: Several silos have been built, but corn has not been abundant this year.

Thurlow, Hastings: Silos are not generally used. People are not planting western corn for cow feed as much as they used to do. They can get more milk by feeding common hill corn.

Medora and Wood, Muskoka: There is only one silo in this locality to my knowledge. Corn put in sheds seems to be preferred.

Thessalon, Algoma: There is only one silo in the township.

BUCKWHEAT.

This crop does not seem to be a general one, and correspondents had not much to say regarding it. The November bulletin said that buckwheat was badly affected by drouth at the time of blossoming, and frost also did considerable injury. The consequence was that the crop was a comparatively poor one, although some correspondents reported a good yield. The following table gives the acreage and yield by county groups and for the Province:

Districts.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.
Lake Erie.....	15,874	256,255	16.1	17,374	313,886	18.1	12,908	234,254	18.1
Lake Huron.....	5,136	95,744	18.6	4,046	99,143	24.5	1,871	35,523	19.0
Georgian Bay.....	15,193	246,633	16.2	12,423	292,469	23.5	3,817	73,891	19.4
West Midland.....	8,802	169,853	19.3	7,504	168,150	22.4	3,733	71,928	19.3
Lake Ontario.....	41,445	587,011	14.2	47,207	1,054,247	22.3	32,184	615,952	19.1
St. Lawrence and Ottawa..	44,975	714,394	15.9	42,884	1,074,365	25.1	32,544	674,152	20.7
East Midland.....	17,460	280,155	16.0	19,083	437,215	22.9	10,941	207,710	19.0
Northern Districts.....	1,509	23,600	15.6	1,148	24,711	21.5	792	16,487	20.8
The Province.....	150,394	2,373,645	15.8	151,669	3,464,186	22.8	98,790	1,929,897	19.5

There has been a slight falling off in the total acreage, but the small average yield per acre has brought the total yield for the Province down to 2,373,645 bushels compared with 3,464,186 in 1897. Not one district in 1898 equalled the average yield of the Province for the seventeen years. Over one-half of the buckwheat raised in Ontario is grown in the Lake Ontario and the St. Lawrence and Ottawa districts.

BEANS.

Judging by the remarks of correspondents, beans do not appear to be increasing in popularity as a field crop. The August bulletin said that the crop was more or less affected by drouth and frost, but despite these drawbacks it would be a little above the average for yield.

The November bulletin had the following to say : “ Oorrespondents are far from unanimous regarding this crop. However, it appears to have turned out best in the Lake Erie counties, where the bulk of the crop is grown. Frost and drouth were the chief drawbacks.”

The acreage and yield of beans are given in the following table by county groups and for the Province :

Districts.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.
Lake Erie.....	34,040	576,897	16.9	37,017	711,511	19.2	27,122	461,662	17.0
Lake Huron.....	1,628	26,734	16.4	2,619	50,121	19.1	1,276	22,784	17.9
Georgian Bay	856	16,344	19.1	1,008	22,690	22.5	510	9,568	18.8
West Midland.....	2,031	34,237	16.9	2,570	49,784	19.4	1,692	29,796	17.6
Lake Ontario.....	2,316	31,709	13.7	2,814	53,442	19.0	2,778	48,283	17.4
St. Lawrence and Ottawa..	3,236	55,737	17.2	3,424	74,007	21.6	3,367	68,579	20.4
East Midland	841	13,294	15.8	953	17,103	17.9	805	13,464	16.7
Northern Districts.....	272	4,705	17.3	186	2,682	14.4	116	2,005	17.3
The Province.....	45,220	759,657	16.8	50,591	981,340	19.4	37,666	656,141	17.4

The average yield per acre is 16.8 bushels, which is 2.6 bushels less than that of the preceding year, and .6 bushel below the average of the seventeen years. There is also a decrease in the total acreage of beans, the result being that the total yield for the Province is 759,657 bushels, or 221,683 bushels less than in 1897. The Lake Erie group grows about three-fourths of the beans of the Province.

FIELD ROOTS.

The following opinion was expressed in the August bulletin regarding roots : “ The large majority of reports as to the root crops are encouraging, the only drawback being the excessive and long-continued drouth which has retarded development in many localities. With a due amount of moisture during the remainder of the season there will be a good yield, but otherwise the crop will be a light one. Little injury has been done by insects, except that two or three correspondents refer to the ravages of grasshoppers in Muskoka and Manitoulin.”

POTATOES. The August bulletin contained the following : “ The potato crop will be considerably below the average in most localities owing to the late frosts in June and July, which were very destructive in the Northern Districts and some low-lying lands elsewhere, and the more recent drouth, the effects of which have been generally felt throughout the Province. A good yield is anticipated in the St. Lawrence counties, where the conditions have been more favorable, and timely rains may bring some improvement in the case of late-planted crops. The ravages of the beetle are noted by some correspondents as an additional cause of the shortage, and blight has appeared in a few sections.”

Potatoes were thus referred to in the November bulletin : “ The potato crop is light throughout the Province, owing to the effects of the late frosts and the protracted drouth. Early potatoes suffered most severely, being a complete failure in many instances. The quality of the crop secured is almost uniformly good, and but few cases of rot are reported ; neither do the ravages of the potato bug appear to have been so destructive as formerly. The yield was nearly all out of the ground as correspondents wrote, except in a few localities where delay has been occasioned by wet weather.”

The following table gives the acreage and yield of potatoes by county groups and for the Province :

Districts.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.
Lake Erie	17,664	1,660,236	94	17,840	1,189,427	67	16,631	1,655,854	100
Lake Huron	13,274	1,093,384	82	13,851	1,141,532	82	12,873	1,437,265	112
Georgian Bay	15,063	1,415,615	94	15,811	1,495,833	95	14,397	1,782,944	124
West Midland	29,505	2,444,776	83	30,527	2,481,296	81	27,861	3,243,732	116
Lake Ontario	37,258	2,958,583	79	38,066	3,225,326	85	33,586	3,640,868	108
St. Lawrence and Ottawa ..	38,963	3,402,535	87	35,883	4,334,533	121	38,192	4,609,737	121
East Midland	12,947	920,787	71	12,436	1,491,041	120	12,361	1,450,596	117
Northern Districts	5,272	462,709	88	4,919	741,809	151	3,683	527,608	143
The Province	169,946	14,358,625	84	169,333	16,100,797	95	159,584	18,348,634	115

The acreage of potatoes is slightly larger than in the preceding year, but the total yield is only 14,358,625 bushels, or 1,742,172 bushels less than in 1897, and 3,990,009 less than average for the seventeen years. This is owing to the very poor average yield, which is but 84 bushels an acre, compared with 95 bushels in the preceding year and 115 bushels for 1882-98. The St. Lawrence and Ottawa group has resumed its place in the lead in the matter of acreage.

MANGEL WURZELS. The following appeared in the November bulletin : " This has probably been the most successful of any of the root crops during the past decidedly unfavorable season, yielding well in most parts of the Province. Several correspondents point out that mangels have stood the continued drouth better than turnips, though the size, of course, is smaller and the plant more rooty than would have been the case with a more even distribution of moisture. Very little of the crop remains to be taken up."

The acreage and yield of mangels is given in the following table by county groups and for the Province :

Districts.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.
Lake Erie	3,675	1,599,488	435	3,279	1,277,870	390	1,868	777,097	416
Lake Huron	6,952	3,220,740	463	6,155	2,688,763	437	3,401	1,564,845	460
Georgian Bay	2,546	1,080,758	424	1,770	793,134	448	1,180	499,848	424
West Midland	15,703	7,793,647	496	13,690	5,965,785	436	8,195	3,830,253	467
Lake Ontario	11,012	4,951,899	450	9,353	4,497,485	481	6,160	2,729,437	443
St. Lawrence and Ottawa ..	4,953	2,119,556	428	4,131	1,694,830	410	2,417	948,660	392
East Midland	2,834	1,122,397	396	2,546	1,103,992	434	1,735	714,891	412
Northern Districts	248	69,079	279	251	81,528	325	118	36,527	310
The Province	47,923	21,957,564	458	41,175	18,103,387	440	25,074	11,101,058	443

Every group except the Northern Districts shows an increased area given to mangels compared with the previous year's figures. The yield per acre is 458 bushels, being 18 bushels more than in 1897 and 15 bushels above the average for the seventeen years. The total yield is 21,957,564 bushels, which is 3,854,177 more than in the preceding year. The West Midland counties have the largest acreage in mangels.

CARROTS. Correspondents for the November crop report had not a great deal to say regarding carrots. Their remarks were thus summarized: "Where grown, carrots have, as a rule, done well, especially in the west, though affected like other root crops by the dry weather. The yield has been got under cover in good condition in nearly all localities."

The table following gives the acreage and yield of carrots by county groups and for the Province:

Districts.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.
Lake Erie	1,387	443,955	320	1,340	412,414	308	904	283,198	313
Lake Huron	1,025	383,273	374	1,075	390,355	363	1,028	371,598	361
Georgian Bay	937	323,882	346	736	267,301	363	1,026	370,885	361
West Midland	2,037	756,726	371	2,392	898,505	376	2,244	844,595	376
Lake Ontario	2,491	888,274	357	2,336	911,026	407	2,499	921,136	369
St. Lawrence and Ottawa ..	2,948	1,024,592	348	2,717	953,743	351	1,965	643,968	328
East Midland	1,129	377,789	335	1,074	450,598	419	938	321,289	343
Northern Districts	464	115,370	249	455	149,686	329	245	70,138	286
The Province	12,418	4,313,861	347	12,025	4,433,628	369	10,849	3,826,807	353

The number of acres of carrots grown in the Province has been increased by 393, but the acreage is still very small compared with that of the other field crops. The yield per acre for 1898 is 347 bushels, which is 22 bushels less than in the previous year and 6 bushels below the average for the seventeen years. The crop appears to be increasing in popularity in the St. Lawrence and Ottawa district, and the reverse in the West Midland group.

TURNIPS. The November bulletin said: "There has been a fair average yield of turnips, the crop thriving better as a rule in the western rather than the eastern districts. Many correspondents note the ravages of the green aphid, which seems to be especially destructive to the Swede turnip, though the drouth was the principal drawback. The recent wet weather has caused rot in some neighbourhoods. The crop has been secured except in a few places."

The acreage and yield of turnips, by county groups and by the Province, is given in the following table:

Districts.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.	Acres.	Bushels.	Per acre.
Lake Erie	2,755	958,285	348	2,900	1,020,893	352	2,665	959,930	360
Lake Huron	16,735	7,723,601	462	16,096	7,800,556	485	14,499	6,134,958	423
Georgian Bay	19,994	8,948,576	448	18,810	8,746,994	465	15,073	6,482,744	430
West Midland	46,237	21,291,882	460	46,879	21,149,337	451	39,186	17,260,401	440
Lake Ontario	42,722	16,545,608	387	42,078	20,099,941	478	34,508	14,960,847	434
St. Lawrence and Ottawa ..	8,500	3,722,453	438	8,037	3,352,248	417	5,272	2,022,565	384
East Midland	11,373	4,402,735	387	11,097	4,924,296	444	7,711	3,011,036	390
Northern Districts	3,285	1,134,737	345	3,439	1,202,883	350	2,515	835,805	332
The Province	151,601	64,727,882	427	149,336	68,297,148	457	121,429	51,668,286	426

The yield per acre for the year is 427 bushels, which is one bushel more than the average for the seventeen years, but 30 bushels lower than the average for 1897. This makes the total yield of the Province, notwithstanding an increased area, to fall 3,569,266 bushels below that of the preceding year. The largest acreage of turnips is found in the West Midland group, which is well known as the leading beef-raising district.

SUGAR BEETS. The November bulletin, in referring to sugar beets, said that the crop was a very limited one, being grown in comparatively few localities. "The reports which mention the sugar beet are on the whole favorable, the crop being a fair one, though in some parts the beets run small. It is now practically all housed."

HAY AND CLOVER.

The prospects for clover, as correspondents wrote in May, were most favorable. Some heaving by frost—occurring chiefly in the early part of April—was reported in nearly every district, but not to so great an extent as to be considered serious; while, on the other hand, many reports described clover as looking splendid, especially in the case of new fields. Reports from the St. Lawrence and Ottawa counties were particularly good. Alsike did not stand the winter as well as red clover.

The August bulletin remarked: "Correspondents are almost unanimous in favorable comments regarding this crop. While old meadows did not do so well, newly sown fields have large yields. Three tons to the acre are frequently reported, and four and five tons per acre are also mentioned. The yield will be about one-third above the average. Many farmers cannot find room in their barns for the surplus crop. In addition to the generous yield the crop generally has been saved in first-class condition, several correspondents claiming that in this respect it is the best for many years. Cutting was earlier than usual. Alsike did not do so well as red clover or timothy, and there will be a remarkable scarcity of seed in the case of this variety."

CLOVER SEED. The November bulletin said of clover seed: "Owing the midsummer drouth the crop of red clover seed, especially in the counties west of the St. Lawrence, was very light, the midge in the Lake Erie, West Midland and Lake Ontario groups also helping to injure the crop. Alsike, on the other hand, was well spoken of in the west. In the eastern counties, however, red clover was the better crop of the two, alsike in some cases being a failure. Briefly stated, the clover seed crop in general is not up the average."

The following table gives the acreage and yield of hay and clover by county groups and for the Province:

Districts.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Tons.	Tons per acre.	Acres.	Tons.	Tons per acre.	Acres.	Tons.	Tons per acre.
Lake Erie.....	311,569	550,746	1.77	298,208	577,624	1.94	283,819	416,030	1.47
Lake Huron.....	276,401	486,022	1.76	266,535	532,224	2.00	254,168	353,780	1.40
Georgian Bay ..	205,823	352,277	1.71	191,932	342,191	1.78	202,567	265,257	1.31
West Midland.....	419,845	809,303	1.93	406,695	858,891	2.11	418,317	643,798	1.54
Lake Ontario.....	406,853	792,596	1.95	375,216	603,754	1.61	415,574	580,085	1.40
St. Lawrence & Ottawa	594,982	1,011,637	1.70	580,371	639,980	1.10	591,011	787,333	1.33
East Midland.....	157,680	281,842	1.79	146,541	166,811	1.14	162,656	194,739	1.20
Northern Districts....	80,350	114,640	1.43	75,990	90,043	1.18	55,625	69,075	1.24
The Province	2,453,503	4,399,063	1.79	2,341,488	3,811,518	1.63	2,383,737	3,310,097	1.39

The yield of hay per acre is 1.79 tons, being .16 ton more than 1897, and .40 ton more than the average for the seventeen years. This, with the increased acreage, lifts the total yield from 3,811,518 tons in 1897 to 4,399,063 tons in 1898. Hay has its largest acreage in the dairy counties of the St. Lawrence and Ottawa district, but the West Midland group shows the best yield per acre for the three periods given in the table.

FROM THE AUGUST RETURNS.

Malden, Essex : There is not enough manure used on grass land.

Harwich, Kent : Hay is plentiful. There is quite a lot of old hay on hand, the price being so low that some farmers left it stacked in the fields. Clover seed is so low that farmers are pasturing their clover.

Raleigh, Kent : We had only one shower during the whole haying season.

Walsingham, Norfolk : We have had one of the best crops of hay for several years—an excellent, sweet, well-cured crop. Clover seed will be light.

Dawn, Lambton : The crop was light in this vicinity, but is worth more for feeding purposes.

Turnberry, Huron : I think as to quantity and quality it is the best crop of hay I ever saw, and I have seen nearly fifty hay harvests in Canada.

Amabel, Bruce : It was the heaviest and best crop of hay I have ever seen, and it has been safely harvested. Some of the yields appear fabulous. I had five tons off an acre and a half, and a neighbor says he had four tons off one acre, but these are exceptional.

Arran, Bruce : Hay, especially clover, never was as plentiful in this locality, and it has been saved in such fine order, except in some cases where it was too long in being cut.

Westminster, Middlesex : Saved in splendid condition. This year's seeding is not so even and good as last year's, owing to the very dry weather.

Dereham, Oxford : New clover is extra good. Old meadows are not so heavy, but hay generally is of excellent quality, as it has been fine weather for curing.

Dumfries, S., Brant : A large amount of well-cured hay has been secured.

Elma, Perth : Hay has seldom been saved in better condition.

Garafraxa, Wellington : Hay is a splendid crop, harvested in best condition. It is impossible for it to be better. Every farm has one or more stacks in addition to its ordinary supply.

Luther, E., Dufferin : There will be any amount of first-class hay for sale. Farmers will likely hold their hay over, as present prices would not pay for handling.

Barton, Wentworth : Hay was a good crop, and farmers have plowed more clover in this year than ever before, which shows wisdom.

Glanford, Wentworth : Clover grew with great luxuriance early in the season, so that there is very little hay but what is mixed. Hay is not so weedy as last year.

Trafalgar, Halton : Clover was an excellent crop, and most of it was saved in good condition, although frequent showers discolored much of it in the earlier part of haying.

Gwillimbury, E., York : A good yield got in in first-rate condition, the hot, dry weather being very favorable for hay-making.

Darlington, Durham : Early cut hay has been somewhat colored by showers. Later has been saved in splendid condition. It is the largest general yield for years.

Haldimand, Northumberland : Haying weather was never more favorable. There are many stacks of fine hay to be seen. I think we shall have to press hay and send it to a better market, as there is not stock enough to eat it.

Hamilton, Northumberland : Hay is an enormous crop. It has never been known to be so good in this district.

Ameliasburg, Prince Edward : Nearly all the hay was cut and harvested in good order, as the weather was fine. It will be double the average crop.

Richmond, Lennox : Weather conditions during harvesting were superb. Nearly all was secured without injury from rain.

Pittsburg, Frontenac : There is a large amount of clover. We never handled so much clover without getting any rain.

Yonge and Escott Rear, Leeds : The hay crop is a good one. The weather was beautiful for cutting and curing; in fact I never saw a better season for harvesting hay and clover.

Lancaster, Glengarry : We have any amount of clover this year where we used to have timothy. The season favored clover. Old timothy meadows are poor; newly seeded fields are better.

Russell, Russell : Never had a better crop, and never a more seasonable season for making.

Osgoode, Carleton : The hay crop as a whole was good, and was saved in better condition than ever before.

Pembroke, Renfrew : Hay was harvested in good condition. Clover has been an extraordinary crop all through this county.

Drummond, Lanark : Hay on new fields is pretty good, but on new meadows is very light.

Lindsay, Victoria : In this vicinity alsike clover is an abundant crop. There was plenty of bloom, but the honey bees did not frequent such fields while in bloom. Now the farmers find there is no seed, or at least not sufficient to pay for saving it.

Otonabee, Peterborough : Clover has been well saved. That of the first year has been thick and heavy, and old meadows gave a good crop.

Monmouth, Haliburton : Hay is the best saved in my experience of twenty-two years, so that it will make up for the light crop.

Sidney, Hastings : The hay crop was a splendid one, being heavy and got in in very fine condition. There is enough around here, with the good crop of straw, to last two years. Clover this year was the best crop ever grown here.

Morrison, Muskoka : Hay was brought in safely in fine condition. The dry weather made the mowing easy, as there was no extra labor about it.

Ryerson, Parry Sound : Hay has been a good crop and well saved.

St. Joseph, Algoma : Hay is a very heavy crop—perhaps the best in ten years.

Lash, Rainy River : Hay was saved in good condition, although the weather was rather showery. Clover was very fine. There is a prospect of a good second crop, as the land is in a moist condition, and cut meadows have started up briskly.

COMPARATIVE YIELD OF FIELD CROPS.

AGGREGATE YIELD OF FIELD CROPS. The following table shows the total yield of field crops for each of the past five years, and also the average of the seventeen years, 1882-98 :

Field crops.	1898.	1897.	1896.	1895.	1894.	1882-98.
	bushels.	bushels.	bushels.	bushels.	bushels.	bushels.
Fall wheat	25,158,713	23,988,051	15,078,441	14,155,282	16,512,106	18,442,511
Spring wheat.....	6,873,785	4,868,101	3,519,322	3,472,543	3,367,854	7,259,297
Barley	12,663,668	12,021,779	12,669,744	12,090,507	10,980,404	16,235,295
Oats	86,858,293	86,318,123	82,979,992	84,697,566	70,172,516	65,792,653
Rye	2,673,234	3,382,005	2,230,873	1,900,117	1,386,606	1,796,013
Peas	13,521,263	13,867,093	17,498,148	15,568,103	14,022,888	14,248,380
Buckwheat	2,373,645	3,464,186	2,603,669	2,791,749	2,534,335	1,929,897
Beans	759,657	981,340	1,197,535	1,494,179	827,514	656,141
Potatoes	14,358,625	16,100,797	21,305,477	29,390,884	17,163,130	18,348,634
Mangel-wurzels.....	21,957,564	18,103,387	16,849,401	15,961,502	11,532,127	11,101,058
Carrots	4,313,861	4,433,628	4,618,441	4,581,373	3,716,140	3,826,807
Turnips	64,727,882	68,297,148	69,814,841	63,496,702	61,694,487	51,668,286
Corn for husking.....	23,442,593	24,663,998	24,071,364	24,819,899	16,275,352	*19,796,524
	tons.	tons.	tons.	tons.	tons.	tons.
Corn for fodder.....	2,128,073	2,669,822	1,948,780	1,775,654	1,049,765	*1,652,932
Hay and clover.....	4,399,063	3,811,518	2,260,240	1,849,914	3,575,200	3,310,097

In considering the foregoing table it is well to bear in mind that the figures are the result of both acreage and yield. Of the fourteen crops named, six make a better showing than in the preceding year, namely, fall wheat, spring wheat, oats, mangel wurzels and hay. The only crops failing to equal their own figures for the seventeen years are spring wheat, barley, peas and potatoes.

* These figures are the averages for seven years, 1892-98.

AVERAGE YIELDS PER ACRE. The following table gives the average yield per acre for each of the leading field crops by county groups for 1898, and for the Province for both 1897 and 1898, together with the average for the seventeen years, 1882-98.

Field crops.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.		
	1898.	1897.	1882-98.								
Fall wheat	22.4	24.5	26.0	24.5	23.7	24.4	25.4	25.1	24.0	25.2	20.5
Spring wheat	14.9	17.0	16.0	15.5	16.7	20.4	17.2	18.0	17.7	15.1	15.3
Barley	29.7	31.0	27.7	30.5	28.0	27.5	26.7	24.6	28.9	26.6	25.8
Oats	36.0	39.0	34.8	39.7	36.0	35.8	31.6	28.6	36.6	35.5	34.5
Rye	14.7	18.7	16.3	18.5	15.4	17.1	15.7	19.2	16.2	18.0	16.2
Peas	14.2	18.0	15.8	15.6	14.8	17.4	13.4	15.0	15.6	15.5	19.6
Buckwheat	16.1	18.6	16.2	19.3	14.2	15.9	16.0	15.6	15.8	22.8	19.5
Beans	16.9	16.4	19.1	16.9	13.7	17.2	15.8	17.3	16.8	19.4	17.4
Potatoes	92	82	94	83	79	87	71	88	84	95	115
Mangel-wurzels	435	463	424	496	450	428	396	279	458	440	443
Carrots	320	374	346	371	357	348	335	249	347	369	353
Turnips	348	462	448	460	387	438	387	345	427	457	426
Corn for husking	81.3	70.7	42.0	71.5	53.0	57.3	49.0	36.6	70.9	73.6	*71.0
	tons.	tons.	tons.	tons.	tons.	tons.	tons.	tons.	tons.	tons.	tons.
Corn for fodder (green).	8.08	11.07	10.93	11.46	9.99	12.82	10.44	11.78	11.20	12.77	*11.27
Hay and clover	1.77	1.76	1.71	1.93	1.95	1.70	1.79	1.43	1.79	1.63	1.39

All the crops excepting rye (which ties) and peas, buckwheat, beans, potatoes, carrots and corn (both classes), show an increase over their respective averages for the seventeen years. The best yields in 1898 are thus distributed: Lake Erie, corn for husking; Lake Huron, barley, peas, carrots and turnips; Georgian Bay, fall wheat and beans; West Midland, oats, buckwheat, mangels; Lake Ontario, hay; St. Lawrence and Ottawa, spring wheat and corn for fodder; Northern Districts, rye. Potatoes reach their highest mark in both the Lake Erie and Georgian Bay groups.

RATIOS OF AGGREGATE CROPS. The ratio of total yield of each crop in 1898 is given in the following table by county groups and for the Province; 100 representing the average for the seventeen years 1882-98:

Districts.	Fall wheat.	Spring wheat.	Barley.	Oats.	Rye.	Peas.	Buckwheat.	Beans.	Potatoes.	Mangel wurzels.	Carrots.	Turnips.	Hay and clover.
Lake Erie	132	63	124	123	113	86	109	125	100	206	157	100	132
Lake Huron	137	43	104	145	278	110	270	117	76	206	103	126	137
Georgian Bay	160	63	92	133	231	103	334	171	79	216	87	133	133
West Midland	133	52	96	135	200	88	236	115	75	203	90	123	126
Lake Ontario	135	105	54	120	179	95	66	81	181	96	111	137	
St. Lawrence and Ottawa	107	126	78	135	101	87	106	81	74	223	159	184	128
East Midland	151	112	64	127	137	89	135	99	63	157	118	146	145
Northern Districts	334	86	151	153	152	111	143	235	88	189	164	136	166
The Province	136	95	78	132	149	95	123	116	78	199	113	125	133

The figures here presented, as in the previous table, are the results of both acreage and yield. Spring wheat, barley, peas and potatoes fail to reach the standard in the record for the Province. Fall wheat, oats, rye, mangels, turnips and hay show three figures for every group. Not one of the districts has 100 or over for all the crops comprising the table.

* These figures are the average for seven years, 1892-98.

RATIOS OF YIELD PER ACRE. The table following compares the yield per acre in 1898 with that of the seventeen years 1882-98, the latter being represented by 100:

Districts.	Fall wheat.	Spring wheat.	Barley.	Oats.	Rye.	Peas.	Buckwheat.	Beans.	Potatoes.	Mangel wurzels.	Carrots.	Turnips.	Hay and clover.
Lake Erie	117	104	120	104	96	83	89	99	94	105	102	97	120
Lake Huron	120	120	116	109	102	85	98	92	73	101	104	109	126
Georgian Bay	121	110	107	104	94	77	84	102	76	100	96	104	131
West Midland	115	103	109	106	105	77	100	96	72	106	99	105	125
Lake Ontario	113	108	110	102	102	78	74	79	73	102	97	89	139
St. Lawrence and Ottawa.	130	124	114	111	98	92	77	84	72	109	106	114	128
East Midland	129	121	112	102	101	73	84	95	61	96	98	99	149
Northern Districts	120	104	106	95	102	69	75	100	62	90	87	104	115
The Province	117	116	112	106	100	80	81	97	73	103	98	100	129

Rye and turnips reach exactly 100 for the Province, and peas, buckwheat, beans, potatoes and carrots are under that figure, while the other six crops go over 100. Fall wheat, spring wheat, barley and hay show three figures in every district, but none of the groups are up to or over the standard yield for every crop.

FRUIT AND FRUIT TREES.

Under date of May 2nd reports were sent in regarding vegetation, and these returns were summarized as follows: "Correspondents differ greatly in their opinions as to the condition of vegetation, some considering growth as being well advanced for the time of year, and fully as many others regarding the season as being rather backward. In most sections there was a fair bite for cattle at the beginning of May, and fruit trees were coming nicely into bloom with promise of an abundant yield, although the tent caterpillar was appearing in large numbers, and a green aphid was attacking the buds in some districts. In the eastern part of the Province the season was relatively more advanced than in the west."

The bulletin published in August thus dealt with the question of fruit growing: "The apple harvest will be a light one this season, the yield in most cases being considerably below the average. This is attributable, among other causes, to heavy rain storms occurring while the trees were in bloom, which interfered with fertilization, and to the prevalence in many neighborhoods of the tent caterpillar and other destructive insects which have wrought much damage where spraying has been neglected. Much of the fruit is small and hard owing to the drouth. Winter apples will be particularly scarce. Plums, while yielding fairly in some parts, have sustained a good deal of injury in many places from the attacks of the curculio, and the yield as a whole will be below the average. Peaches, as a rule, have done but poorly, and the crop will be small. Pears have been the most successful of the larger fruits, and are likely to be abundant. There was a good yield of cherries, although some losses from black knot are noted. Grapes will also be plentiful. The drouth proved injurious to small fruits, which promised an immense yield. Strawberries yielded fairly, but raspberries were small and dry."

The November bulletin contained the following: "Fruit trees and vines are in a generally healthy and thriving condition, the principal causes of injury noted being storms, blight and, in the cases of plums and cherries, black knot. There were many causes which adversely affected the fruit crop. The drouth and frost inflicted considerable injury during the earlier stages of its development, and much loss has also been

caused by insect pests. The apple crop in particular suffered much from worms, much of the fruit being affected in unsprayed orchards. The tent caterpillar also did injury. Several correspondents note the fact that where spraying was properly attended to these pests were kept in check, and good crops of fruit secured. Notwithstanding all disadvantages the returns from all over the Province, with the exception of a few northerly counties, show that the supply of fruit, more especially of apples, was considerably more than sufficient for home consumption, very large shipments having been made to England and the United States from the western fruit growing section. Pears, peaches, plums and small fruits were also shipped from many localities. There was great variation as to quality, much of the yield being spoken of as inferior."

The acreage in orchard and garden, and in vineyard, is given in the following table by county groups and for the Province :

Year.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
	acres.	acres.	acres.	acres.	acres.	acres.	acres.	acres.	acres.
Orchard and garden	65,631	35,983	25,648	58,354	93,894	35,314	17,512	3,084	335,420
Vineyard	3,069	471	427	574	5,007	405	106	59	10,118
Totals { 1898	68,700	36,454	26,075	58,928	98,901	35,719	17,618	3,143	345,538
{ 1897	66,234	36,453	25,770	57,830	96,728	34,575	16,864	2,987	337,441
{ 1896	61,496	34,514	24,224	56,382	94,036	31,066	15,744	2,660	320,122
{ 1895	60,141	33,210	22,729	55,442	91,863	30,454	16,813	2,135	312,787

Every group shows an increase in the number of acres given to orchard, garden and vineyard, 345,538 acres now being devoted to fruit, of which 10,118 acres are in vineyard. The Lake Ontario and Lake Erie groups furnish nearly half the acreage given to fruit in Ontario.

FROM THE MAY RETURNS.

Colchester S., Essex : All our orchards at present are being examined for the San José Scale. So far as I can learn none have been found in this township.

Gosfield S., Essex : Fruit trees are looking well, with every indication of an abundance of fruit of every kind.

Tilbury N., Essex : A large number of fruit trees have succumbed to the blight of last summer.

Camden, Kent : Not much spraying has been done in this section, but many farmers are making enquiries after this work, and no doubt there will soon be many at it.

Harwich, Kent : I never saw the fruit trees in this locality look better. If blows or blossoms are any indication the peach crop will be an abundant one.

Canboro', Haldimand : Fruit trees are in a very good condition, except the common red cherries, which are nearly all destroyed by black-knot.

Turnberry, Huron : I think that every fruit tree in the township should be sprayed, but although your Department has scattered broadcast information regarding the mode of spraying and the different mixtures, I find that many are either afraid of making mixtures, or are afraid of the expense. I believe that if eight or ten experts at the business were to go around with their appliances through each township and charge a fair rate per tree, there would be money in the business.

Sullivan, Grey : The late winter was exceptionally mild, and hence we are likely to have an extra number of pests to contend with. Insect life in every form is abundant. Young grasshoppers are already abundant. Caterpillars over an inch long were numerous in orchards and woods over three weeks ago. If ever spraying was needed it will be this spring.

Ekfrid, Middlesex : Fruit trees are looking well at present, and promise an abundant crop, but we must fight insect and fungous enemies vigorously. The black-knot on the cherry is very hard to conquer, or the only cure—cutting away—leaves but little of the tree standing.

Beverly, Wentworth : The Government inspector has been all over this township looking for the San José Scale, but has not found any.

Gwillimbury E., York : The fruit trees are full of buds, and some now in blossom, with plenty of tent caterpillars.

Scarboro', York : There is going to be plenty of bloom on apples, plums and cherries, and the caterpillars are going to be as numerous as ever. I noticed to-day that the bud-moth had got to work, and there are also dozens of green lice around where the buds are opening, but what injuries they will do I am not able to say at present.

Brock, Ontario : Fruit trees are looking very well, but on close examination there appear to be a lot of lice or aphides on the buds, which will require spraying to kill them.

Cavan, Durham : Fruit trees are seriously threatened by caterpillars.

Brighton, Northumberland : On this farm strawberries were in blossom on April 24th. At present there is a fine prospect of a good crop of everything.

Laxton, Victoria : Apple trees have been badly affected of late years with bark louse, and in looking over the trees I find that caterpillars are going to do destruction if not taken in time. The spring being warm, they have been hatched out earlier than usual.

Stephenson, Muskoka : Fruit trees are in good shape, except that some are troubled with a small green louse, which eats the centre out of the bud. Spraying will have to be more generally practised or the pest will destroy the orchards.

FROM THE AUGUST RETURNS.

Gosfield N., Essex : The vines are laden down with grapes. Never was a better year for berries.

Harwich, Kent : Leaf curl has injured peaches considerably.

Tilbury E., Kent : In quite a number of cases cherries decayed on the trees. Black-knot is pretty common.

Yarmouth, Elgin : Winter apples will be about a quarter crop. Harvest and fall apples are more plentiful, but falling fast. There is a full crop of pears, but scab and blight are destroying the trees.

Canboro', Haldimand : Apples bloomed well, but a great many fell off. The grape crop is grand ; the vines have all they can bear.

Stamford, Welland : Nothing on most of the apple trees. The crop is light and the quality will, I think, be inferior.

Stanley, Huron : Apples are not a heavy crop and poor in quality. There are very few plums, but the pear trees are fairly loaded.

Tuckersmith, Huron : Apples look well considering the dry season, though the Snow, Astrachan and some other kinds are badly spotted. Some varieties have a splendid crop, but others, including the Northern Spy, so largely grown, are not bearing.

Sarawak, Grey : Few winter apples—not one tree in ten has any fruit on in this county—principally summer and fall fruit.

Sunnidale, Simcoe : Greatest crop of plums for years.

Westminster, Middlesex : Berries were a very fine crop. Wild berries were small, but strong growers like the Cuthbert in reds, the Gregg in black rasps and Snider in black caps, fruited very heavily.

Dereham, Oxford : There are very few winter apples, but a fair crop of early ones.

Oakland, Brant : Strawberries were very plentiful. Raspberries were scarce and injured by dry weather.

Dumfries N., Waterloo : The plums have stood the drouth better than apples, and there will be a fair average crop. The plum trees in general had a good heavy foliage which protected them.

Niagara, Lincoln : Pears are the only fruit crop that looks as well as last year.

Clinton, Lincoln : Rain at blossoming time washed the pollen from the fruit blossoms which consequently were not fertilized.

Saltfleet, Wentworth : Grapes are a heavy crop, except the Rogers varieties, which did not act well.

York, York : Apples are small and injured by scab and codling worm. Caterpillars were prevalent this spring. The spraying of apples is not general.

Darlington, Durham : Fruit trees are so infested with injurious insects, etc., that eternal vigilance and fighting are necessary to secure a crop.

Haldimand, Northumberland : We must all trim well and spray if we are to have a full crop of sound apples.

FROM THE NOVEMBER RETURNS.

Mersea, Essex : The apple crop was hurt considerably from blight and insects. None of the fruit was hurt from frost and hardly any from storms.

Southwold, Elgin : Frost kept off remarkably well this fall. Plenty of fruit for home consumption, and a great many apples shipped away.

- Yarmouth, Elgin : Blight very bad on pear trees. Supply of apples not sufficient for home consumption.
- Walsingham S., Norfolk : Abundance of fruit of all kinds ; a great surplus of apples to ship.
- Dunn, Haldimand : The scab and codling moth destroy at least fifty per cent. of the apple crop.
- Sherbrooke, Haldimand : Codling moth was very bad here. Even sprayed trees did not escape.
- Stamford, Welland : Fruit trees in very good condition. Apples a poor crop ; grapes good.
- Warwick, Lambton : The supply was good of berries and small fruit, but the apples were very wormy.
- Grey, Huron : Fruit is not good. Some orchards are better than others, but very little first-class fruit.
- Howick, Huron : Fruit trees are very much neglected in pruning and also in spraying. The apples are not at all what they might be—they are scabby and deformed.
- Stephen, Huron : The supply of fruit is more than sufficient for local consumption. Large quantities are left to spoil for want of a market.
- Culross, Bruce : Fruit trees of all kinds healthy and vigorous. Abundant fruit for home consumption and a surplus of fall and winter.
- Kincardine, Bruce : We suffered a great loss by insect pests and wind storms, none by blight or frost.
- Bentinck, Grey : Fruit trees are not in very good condition. The caterpillars stripped them of their leaves, and they look a little blate.
- Glenelg, Grey : The crop was exceedingly small, yet of very good quality.
- St. Vincent, Grey : Many thousand barrels of apples exported.
- Tecumseth, Simcoe : Except plums, grapes and currants, all fruits are a comparative failure.
- Vespra, Simcoe : Damage in some places from tent caterpillars and codling moth. Curculio not as bad as last year.
- Nissouri W., Middlesex : Great quantities of apples have been exported to the British markets.
- Norwich N., Oxford : Fruit trees are looking well with a little blight on pear trees. All fruit was a small crop except pears which were a drug on the market.
- Logan, Perth : A good quantity of apples has been shipped. Fall varieties turned out very well, but winter apples are somewhat wormy.
- Garafraxa W., Wellington : Trees are in a healthy state, but a few of them are bad with lice—they seem to be worst on fall trees.
- Waterloo, Waterloo : A great surplus of apples, and they are looking fine and good. Farmers are getting \$1.25 a barrel for the good winter apples.
- Mulmur, Dufferin : Early kinds were deficient ; later fruits much better.
- Niagara, Lincoln : A good many peach trees are being destroyed by a new disease termed rose leaf ; and the blue aphid has been bad on English cherry trees these two years.
- Saltfleet, Wentworth : Apples are in good shape where the trees were sprayed, but injured a good deal by leaf blight where they were not sprayed.
- Trafalgar, Halton : Trees are in good condition, but there was a good deal of loss in some trees planted this season on account of drouth.
- Etobicoke, York : The hail storm did a deal of harm to the apple crop. The fruit is decaying where they were struck by the hailstones.
- Gwillimbury N., York : Plums were abundant. Grapes very fine. Rather dry for other small fruits.
- York, York : Trees and vines are in Al condition, and with a favorable winter we may look for a large crop of all kinds of fruit, if the trees receive proper care in the spring by spraying.
- Pickering, Ontario : There will be shipped from Port Union station this fall about 1,000 barrels of apples. The quality was only fair. The apples were badly affected by scab and sun check.
- Cartwright, Durham : Loss by insects very great where no spraying was done.
- Cramahe, Northumberland : The young fruit trees seemed to have stood the terrible drouth in the summer fairly well.
- Ameliasburg, Prince Edward : Apple crop was very light as a rule, perhaps from effects of frost, as they were better along the water than elsewhere. Other fruits were abundant.
- Winchester, Dundas : Apples were injured in the spring in many orchards, and the crop was light, but the trees seem to have recovered.
- Lancaster, Glengarry : Fruit trees of later planting of good varieties seem to be thriving, but old trees are dying away very fast.
- Caledonia, Prescott : Serious loss in some localities caused by caterpillars in June, and a general percentage by all insect pests.
- Gloucester, Carleton : Apple trees are in pretty good condition now, but they were nearly eaten up by caterpillars the first of summer.
- Thurlow, Hastings : Good young trees have made good growth.
- Tarbutt, Algoma : The fruit that we had was of the very best quality, but still it is hard to get the right varieties of fruit trees for this country.

TOBACCO.

The August bulletin had the following: "The counties of Essex and Kent have been experiencing a boom this year in the growing of tobacco. A large area has been given to this crop, and although the early part of the season was too dry for best results the plants in many cases are quite promising. While many of the growers are practically without experience, the general opinion appears to be that the crop will be a fairly successful one in that particular section. Grasshoppers and the "worms" of the sphinx moth are reported to have done injury to the plants. Correspondents also report tobacco as being grown in the counties of Prescott, Lanark, York, and Lennox and Addington, and on St. Joseph Island, and other sections are also becoming interested in the crop."

November reports were to the following effect: "This crop has turned out well. The season for setting out plants was rather dry, but the general growth was good, and a large quantity of leaf was obtained. A little late planted was caught by frost, but the bulk of the crop escaped. Correspondents speak favorably of the curing. The 'worm' was the worst enemy of the crop."

TOBACCO CROP IN ONTARIO, 1898.

	Acres.	Pounds.	lb. per acre.
Essex.....	5,086	7,095,970	1,395
Kent	2,140	3,013,120	1,408
Other countries	645	451,500	700
The Province	7,871	10,560,590	1,354

FROM THE MAY RETURNS.

Colchester N., Essex: Many farmers are going into raising tobacco, which will necessitate the employing of extra hands.

Gosfield N., Essex: Tobacco growing will be all the rage here this summer.

Pelee Island, Essex. A large number are going to grow a patch of tobacco this year, as our soil and climate are well adapted for its growth. What was grown last summer paid the growers well.

Harwich, Kent: There will be a lot of tobacco planted in this locality this season. The soil and climate seem to be favourable to it.

Raleigh, Kent: There will be less beans grown this year than usual, as tobacco will be all the craze. Some farmers intend to plant as much as twenty-five acres or more, but from five to ten acres will be grown on about every other farm.

FROM THE AUGUST RETURNS.

Colchester N., Essex: The crop will be a medium one. It was dry at setting time. Early set plants are doing well; some are setting out yet.

Colchester S., Essex: Fair to very good. It was too dry at the time of planting, and a good deal of replanting had to be done.

Gosfield N. Essex: There is a large area planted, and it looks all right generally although there are some sickly patches. The sphinx moth worm and grasshoppers have done a little damage.

Gosfield, S. Essex: Plants are very uneven. Weather has been very dry and worms are in full force.

Malden, Essex: Plants are not uniform. It was too dry.

Mersea, Essex: Tobacco is in fair to good condition, although it has been rather dry for the crop and grasshoppers are eating the plants.

Pelee Island, Essex: Early planted tobacco looks well; later is poorer. The first part of July was too dry for the plants.

Camden, Kent: Early planted looks well, but late planted look away behind. Very few farmers have had experience in growing this plant.

Harwich, Kent: Tobacco has been somewhat backward on account of drouth at time of planting, but recent rains are making the crop look splendid. Tobacco worms have been bad.

Orford, Kent: Tobacco has every appearance of being a good crop.

Raleigh, Kent: A large number are now getting their first experience in growing tobacco. Early planted is very good, but late planted is poor. The worm has been a little troublesome.

Scarborough, York: I have seen only a small number of plants which were mailed me on July 1st, out of which I have a few plants which are doing nicely.

Denbigh, Lennox and Addington: Excellent except where hurt by frost. Only small quantities are used for home use.

Drummond, Lanark: Am growing a few plants for trial, and they are doing well.

FROM THE NOVEMBER RETURN.

Colchester, Essex : Tobacco is a splendid crop, and will average about 2,000 pounds to the acre. The first crop was cut long before any frost, and most of the second would have been, but owing to the low price being offered a great part of the second crop will not be saved.

Colchester, Essex : This part of the country has had a complete change in the season's work. The high price for tobacco last year set farmers wild, and a large area was sown, running from one to sixty acres with some, while scarcely a farm is without its small patch. The acreage is really more limited than expected, as fully one-fifth of the land planted became vacant owing to plants not starting for want of moisture.

Colchester, Essex : Tobacco has been a good crop, but the douth was bad for setting, causing an uneven growth.

Gosfield N., Essex : Tobacco is a large crop, but it has been injured some by grasshoppers.

Mersea, Essex : Tobacco is one of the best crops for years.

Pelée Island, Essex : Old growers say tobacco is a good crop this year, except where ravaged by the worm.

Harwich, Kent : Tobacco is a good crop and well saved generally, although some planted more than they could care for.

Harwich, Kent : Tobacco is a good crop. The tobacco worm or green grub was a source of annoyance. Where the crop was well attended to it gave a good return.

Orford, Kent : A good deal of the tobacco is poor, many patches having been frosted.

Thorold, Welland : There have been a few trials with a large growth.

Howick, Huron : There is very little tobacco grown here. A few of the Germans grow it for their own use, and it was a good crop this season.

Westminster, Middlesex : Tobacco is not generally cultivated, but it has done remarkably well. The plant suffered to some extent from the tomato worm.

Hawkesbury E., Prescott : Tobacco is cultivated in small plots, and is a fair crop.

Glamorgan, Haliburton : Tobacco is not grown here except for the flower (*Nicotiana affinis*).

FLAX.

Owing to a number of western flax mills having closed down during the last two years the acreage of flax has fallen off greatly. The crop will be only middling in quality, frost and drouth having told upon both seed and stalk. The area in flax dropped from 16,240 acres in 1897 to 10,720 acres in 1898.

FROM THE AUGUST RETURNS.

Plympton, Lambton : There is a pretty good crop, but there is not much grown.

McKillop, Huron : There is no flax grown here this year, as the mill is closed up.

Wawanosh E., Huron : Flax is in good condition, but not much has been grown this year, as the crop was not profitable last year.

Turnberry, Huron : There is a very heavy crop of fibre. The crop of seed will be affected somewhat by frost. However, it will be a good all round crop.

Holland, Grey : Flax looks well, but only small patches are raised.

Zorra, E., Oxford : Flax is all right where sown in good time. Late sown is injured by frost and drouth.

Elma, Perth : Flax is a fair crop this season, but it has not been so much sown as formerly on account of the flax mills being shut down in this locality. Farmers are tired of pulling flax by hand and selling for \$7 or \$9 per ton.

Wallace, Perth : Not so much has been sown on account of the flax mill at Listowel being closed. Flax has suffered somewhat from the frost.

Ramsay, Lanark : Flax is in good condition, but only a little is grown.

FROM THE NOVEMBER RETURNS.

Stephen, Huron : Flax is not as much cultivated this year as formerly.

Stephen, Huron : Thousands of acres are sown every year to flax. There are no less than four flax mills in the township. The flax dealers buy it from the farmers by the ton. Of course it is a little ready money to a man, but then it is very hard on the land, as everything is drawn away and no return is made to the soil. I consider this is a poor way to farm.

Wawanosh E., Huron : A number of acres of flax are grown in this section, and this year the crop turned out fairly well. The price for the raw material at the mill is considered poor, and that is one reason why it is not grown. There is more pasture and more feeding of cattle year by year, and less raising of cereals.

Biddulph, Middlesex : There is a flax mill at Lucan, and consequently a considerable acreage of flax is grown. It is generally grown upon old rough pastures, the first crop after being plowed up, and is considered profitable—more so than anything else on that kind of land.

Blanshard, Perth : A considerable amount of flax is sown in this township and seems to be a paying crop. The men who run the mill rent a field and supply seed and hands to pull the crop when ripe. The farmers do the rest of the work and hauling to mill, and are paid about \$12 to \$15 per ton.

HOPS.

This crop is confined to a few sections, and, while having suffered from the drouth, appears to be freer than usual from the attacks of the aphid.

FROM THE AUGUST RETURNS.

Wawanosh E., Huron : A few hops are raised, and are in good condition, although it has been too dry and hot.

Brant, Bruce : Hops are not generally grown. There is only one yard near here.

Eramosa, Wellington : My hop yard is looking very well. The frost has not done any damage so far.

Hamilton, Northumberland : Hops are almost a failure on account of drouth.

Brighton, Northumberland : The crop will be a poor one, as it has been affected by both drouth and lice.

Ameliasburg, Prince Edward : Hops will be a middling crop. After the early rains the ground became very dry.

Denbigh, Lennox and Addington : Hops are in good condition. Only small quantities are raised for local consumption.

Augusta, Grenville : Hop are promising well. The vine is heavy, and there is no aphid as yet or mildew.

Edwardsburg, Grenville : Hops make a good show at present.

Algona S., Renfrew : Hops are in good condition. Just enough for home use are raised.

FARM SUPPLIES IN THE SPRING.

In summing up the reports just received the May bulletin said ; " There appears to be a surplus of hay in nearly every section of the Province, but more especially in the west. Much of the crop is not of good quality, although, of course, there is a fair amount of first-class hay yet to be had. Owing to the large quantity available for sale prices were low all winter. Reports regarding oats vary, for while many claim that there is a scarcity, others hold that there is still a good supply left. Oats were fed more freely than usual during the winter, and during the last few months a large quantity was marketed, consequently there was hardly as much as usual in the hands of farmers at the beginning of May. 'Dollar wheat' created an active market, and during the last month an immense quantity has changed hands. It looks as if nearly all the crop has been disposed of in some quarters, although farmers are occasionally spoken of as having from fifty to a few hundred bushels of wheat ready for a further rise in price. Store cattle are said to be scarcer than usual, but in some places 'equal to the demand.' Complaints are made of the low price for beef, especially when offered for fat animals, and many of this class of cattle are being kept for better figure in some of the western counties, and consequently there are rather more in the hands of farmers than are desired ; but in the eastern counties fat cattle are scarce."

FALL PLOWING.

"The progress made in fall plowing up to the first week of November" said the bulletin issued in that month, "has been highly satisfactory and in advance of most seasons. The soil in most places during the earlier part of the fall was too dry to be favorable for plowing, but the late heavy rains have brought it into splendid condition, and where farmers have not been too busy with harvesting or other departments of farm work requiring immediate attention they have taken advantage of the opportunity, and in many quarters the fall plowing is already finished or nearly so. In some parts, more particularly in the eastern section, the work has been considerably retarded by the rainfall which has rendered low-lying lands unworkable. The indications are that the area plowed will be greater than usual."

THRESHING AND MARKETING.

The November bulletin said: "Threshing was undertaken earlier than usual this season, and in most cases is already finished, very little remaining to be done. Marketing has been slow in most sections, as, on account of low prices for wheat there is a disposition among farmers to hold for a rise—few selling except when compelled to do so. The great bulk of the coarse grains is fed to stock, the growers as a rule finding it more profitable to dispose of them in this form, but the surplus of oats, peas and barley are finding a ready sale at good prices. The figures offered by buyers in some localities are stimulating sales."

FARM IMPROVEMENTS.

November reports were to the following effect: "Good progress has been made in underdraining, especially in the western sections of the Province. There is an adequate supply in nearly all localities, excepting in some of the eastern counties where open draining is the rule—and few complain as to the scarcity of skilled labor. Tile draining machines are very little in use, and the general opinion is against them on the ground that they cannot be operated successfully except where the soil is free from stones. The past season has witnessed substantial advancement in fencing and the quality of farm buildings, the most noteworthy features being the substitution of wire or straight rails for the old style snake fences, and the adoption of stone basements with cement floors for barns. There is a general disposition to discontinue the use of barbed wire in favor of woven wire fencing."

FROM THE NOVEMBER RETURNS.

Colchester, Essex: Great improvement is being made in fencing, chiefly in the different kinds of wire fence. The improvement in farm buildings is increasing yearly.

Mersea, Essex: Great improvements are being made in farm buildings and fencing. The new fences are nearly all being made of wire.

Orford, Kent: There is a wire fence boom on just now. Everybody who can afford it, and some who cannot, are putting up more or less of this kind of fencing, and it looks nice, too. Buildings are being improved constantly.

Yarmouth, Elgin: A great quantity of wire fence has been put up, and also a number of basement barns and stables.

Walpole, Haldimand: Straight fences, some rail and some wire, are taking the place of the old worm fence. A number of barns have been put up lately, most of them with basements.

Thorold, Welland: Fencing is now nearly all of wire, which is cheap, and can be put up in a more permanent form. Cement is being used in the erection of some farm buildings.

Dawn, Lambton: Wire is used very extensively on the older farms, and in a few years there will be no rail fences. There is a great progress in farm buildings—so much that a man having traveled through here ten years ago would scarcely believe the change.

Ashfield, Huron: A great many are raising their barns and putting stone foundations under them.

Hullett, Huron: Considerable fencing and building have been done. A few pig pens have also been built of gravel and cement.

Stephen, Usborne : Great improvements are being made in buildings. Every man who has not a bank barn is building one. The same may be said about good fences. A smooth wire fence and wooden straps is most used.

Brant, Bruce : The old snake fence is being replaced by wire, straight and other patent fences. Fine barns and other out buildings are being put up in this locality, and also some good houses.

Glenelg, Grey : A number of first class farm buildings have been erected this summer, and most farms are being steadily improved in fencing and otherwise.

Sullivan, Grey : Frame barns and stone and brick houses are taking the place of the old log buildings.

Sydenham, Grey : More building was done last summer than I ever remember in one year before. Some houses were put up, but the work was chiefly confined to barns and outhouses.

Oro, Simcoe : About the usual amount of fencing and building has been done. Our farm buildings are improving in character.

Caradoc, Middlesex : There has been much improvement both in fencing and building. Many fine bank barns with brick foundations have gone up this year.

London, Middlesex : Many new barns have been built, and many old ones raised and placed on stone and concrete walls.

Westminster, Middlesex : Wire fences are taking the place of rails. Many of the locust hedges were badly injured by field mice where the snow drifted behind rail fences. Bank barns are all the rage, and they are very necessary where dairying is practised and roots fed.

Blandford, Oxford : Many barns have been enlarged and improved, and a good deal of wire has taken the place of the old snake fence. But barbed wire is, I think, happily going out.

Norwich N., Oxford : Many barns are being put on walls, and the basement floored with cement. They are all right, being the best floor ever made here.

Zorra E., Oxford : Considerable wire fencing has been done and a great deal of building—more than for some years past.

Oakland, Brant : More plain wire fences of excellent style are now built ; very little, if any, barbed wire fencing is now put up.

Elma, Perth : Not much fencing has been done, but a great many new brick houses have been put up, many of them with slate roofs.

Guelph, Wellington : Fences are being removed and fields enlarged. There is a great improvement in the general appearance of the country. Many farm buildings have been overhauled and renovated.

Minto, Wellington : More straight rail fences are being built, saving both rails and land. A number of large frame barns have been erected, and a few houses.

Waterloo, Waterloo : Not much building has been done this year, excepting that a few barns have been rebuilt and others changed inside. Straight fences are fast taking the place of the old worm fences. Some are using the old rails, while others prefer wire.

Garafraxa E., Duferin : The old snake fence is rapidly disappearing. Barns are being put up in the best style, with modern improvements—with bank barns.

Glanford, Wentworth : Remodelling and enlarging frame barns, with the addition of basement stables, is steadily progressing. Hedges and wire fencing are gradually supplanting the old worm fence.

Esqueping, Halton : Quite an improvement has taken place in the matter of fencing. Wire fences have been largely put up, and quite a number of new barns have been erected with stone walls under them.

Chinguacousy, Peel : A lot of wire fencing has been done this year, and a number of new bank barns have been erected.

Gwillimbury N., York : Many farmers are putting up straight rail and wire fences. A number of large barns have been built, with commodious stone stables underneath. In fact there has been a regular barn building boom.

Markham, York : Some of the most noticeable buildings which have been erected lately are pig stys, of which several have been built.

Vaughan, York : A good deal of fencing has been done, and a goodly number of barns have been raised on stone basements.

Pickering, Ontario : There is a marked improvement in fencing and farm buildings, especially in barns. Many have pulled down their old ones, and have put up the latest improved bank barns.

Hamilton, Northumberland : Perhaps never before has there been such a number of barns repaired and built upon stone foundations within late years as is the record this year.

Seymour, Northumberland : A good deal of building has been done during the last year.

Athol, Prince Edward : Considerable improvement has been made on farms by substituting straight fences for crooked ones. Barn buildings are improving every year. Some fine new ones have been erected, and several old ones repaired.

Denbigh, Lennox and Addington : Some of our crooked worm or snake fences are giving way to straight rail and wire fences. There have been considerable improvements made lately to farmers' houses and out buildings.

Pittsburg, Frontenac : There has been a good deal of improvement in fencing and farm buildings in this township.

Augusta, Grenville : Fences are being removed in many cases. The township is over-fenced now with a poor class of stone walls and rail fences. Some new wire fences are going up, but very little is being done in new farm buildings.

Mountain, Dundas : Considerable improvement has been made in the way of wire fences. Farm buildings have also been improved, and cement floors have been put in some of our stables.

Lancaster, Glengarry : Old rail fences are disappearing, being replaced by wire fences. Not many new buildings have been put up.

Hawkesbury, Prescott : Great improvements are being made in farm buildings. There are larger barns and better houses for cattle.

Osgoode, Carleton : Fencing with wire is almost universal here. A large number of new barns on an improved principle have been built this season.

Bathurst, Lanark : Some nice fences and some first-class farm houses have been built this year.

Eldon, Victoria : Quite a number of farm buildings went up this year, and a few farmers are putting up wire fences.

Mariposa, Victoria : Wire fences are beginning to take the place of the old rail affair—woven fences are the favorites. Some new barns have been built, and some old ones widened and remodelled.

Harvey, Peterborough : There has not been much improvement in fencing, but some in farm buildings, both in houses and barns.

Thurlow, Hastings : A good deal of wire fencing has been built this year of different kinds, except the old barbed wire, which has gone out.

Morrison, Muskoka : Improvements in fencing and buildings are about as usual. Fencing consists more of wire, as rail timber is getting scarce.

Ferris, Nipissing : There is great improvement in fencing and building.

Assignack, Manitoulin : Considerable improvements have been made in fencing and buildings, and altogether farmers appear more encouraged.

Cockburn Island, Manitoulin : Very little improvement has been made in buildings, but I expect to see some in the near future, a saw mill having just been started—the first steam engine and circular saw the island has ever known.

Tarbutt, Algoma : There was quite an improvement in farm buildings. Some very fine barns and other buildings have been built this summer.

REMARKS OF CORRESPONDENTS.

RAPE.

Yarmouth, Elgin : There is a large increase in the quantity of rape sown. It has been found to be a good food for hogs as well as for lambs.

Kincardine, Bruce : I sowed about ten acres of rape this year. It was a heavy crop, the most of it being about three feet high. I feed and finish off lambs on it. It also enriches the land, as the sheep droppings are as good almost as a coat of manure.

Garrafraxa W., Wellington : Rape is generally grown for fall feed and does well in our neighborhood. It puts the stock in fine trim for the winter, and gives feeders a good start. Sheep also do well on rape.

Minto, Wellington : I have found sowing two pounds of rape seed per acre broadcast among the spring grain when it was nicely up, and then rolling, gave a nice fall feed besides enriching the land, especially when pastured by sheep. When sown with grain it is apt to get too far ahead, but sown later the grain holds its own place.

Binbrook, Wentworth : We sowed ten acres of rape this year in oats, sown after the oats were up about one month, harrowed in with the sulky horse-rake ; it is making us a fine lot of sheep pasture.

Nassagaweya, Halton : Rape is grown pretty generally in this locality, principally for fattening lambs, which has become a very profitable industry in late years.

Saltfleet, Wentworth : Some Essex rape was sown in this locality as a catch crop among vineyards and orchards. I sowed about twenty acres the first week in August, and have a splendid crop of green stuff to plow under next spring.

Markham, York : Rape is grown to a large extent for fall pasturage for sheep and lambs. Much more is grown than formerly.

Mara, Ontario : Rape is extensively grown in this township, being used for fattening lambs, sheep and cattle for the early market, and it is also sometimes plowed down for manure. Millet is also grown as a substitute for hay.

LUCERNE.

Seneca, Haldimand : Lucerne is gaining in our confidence, and considerable has been sown of late on heavy land with satisfactory results.

Brant, Bruce : I have grown lucerne for a number of years, and think it a highly nutritious crop for cattle or pigs if cut in the proper stage. I can get a crop no matter how dry.

Clinton, Lincoln : I have three and a half acres of lucerne mowed for seven years, and it is still good for hay. It seldom gives seed, as the midge destroys the seed.

Augusta, Grenville : Lucerne has been sown more or less by almost every farmer during the last three or four years, but it does not gain in favor. It winters poorly the first year, and many farmers do not realize the necessity of cutting the crop in June before the stalk gets woody. Very few, if any, have sown any the second time.

Horton, Renfrew : Last year I sowed an acre and a half of lucerne. The first season it did not do well, but this year I have cut it three times for soiling my cows and working horses, and it has done well. I think it would do well for a hog pasture.

VALUE OF GOVERNMENT RETURNS.

FROM THE MAY RETURNS.

Orford, Kent : The practices taught by the Agricultural College in all farm operations are being taken up by farmers so far as they are getting acquainted with them, especially in stock feeding.

Stamford, Welland : The Ontario Agricultural College, Farmers' Institutes and distribution of agricultural reports have done much to assist farmers to a better understanding of their calling, and to show us that the man who follows the leading of science is the man who is going to succeed in agriculture—other things being equal.

Plympton, Lambton : The bulletins issued by your Department and circulated among the farmers of our Province are doing a good work. In talking with farmers I notice that they make frequent reference to what such and such a bulletin said on that point. The farmer is becoming better educated and is becoming a man of thought and observation. From a trip last summer to the Government Farm at Guelph, I am satisfied that no better means could be used to introduce better methods on farms, or to remove the prejudices that still linger in some minds that science in farming is only "humbug."

Hamilton, Northumberland : Lectures at Farmers' Institutes have done much in enabling farmers to adopt improved methods of agriculture. The soiling system is now being largely adopted to supply stock with succulent food in time of drouth.

Carnarvon, Manitoulin : Butter has been wonderfully improved, first, on account of the visit of the Travelling Dairy, and second, owing to a general supply of good water, most farmers having bored wells through the rock, which is come to at various depths ; and also to having better house accommodation.

FROM THE NOVEMBER RETURNS.

Yarmouth, Elgin : Your forthcoming weed bulletin suggests the remark from me that more botany should be taught in our public schools. One of my children has passed the primary, another the leaving and another the entrance examination, and none of them can tell me the weeds as named. This is not as it should be in a farming country.

Thorold, Welland : We have a large home market for that commodity, and I have noticed that a marked improvement has taken place in the quality of the butter since the travelling dairy visited this place.

Keppel, Grey : The Government Farm at Guelph, the bulletins of your Department and the Farmers' Institutes are giving a great impulse to the farming industry.

London, Middlesex : The distribution of bulletins, etc., by our Governments is commendable. Without doubt a great many avail themselves of the same. Where read these bulletins and reports will certainly be productive of results that are good.

Williams E., Middlesex : I appreciate the reports and bulletins of your Department very highly.

Trafalgar, Halton : Bulletin 109, on Farmyard Manure, is a good one.

Brock, Ontario : Every farmer should join the Farmers' Institute and attend all the meetings held in his locality.

Pickering, Ontario : Those farmers who attend to their business, and pay strict attention to the experiments now being carried on at the Government Experimental Farms, and imitating them to a certain extent, are prospering. The farming industry has taken quite a turn for the better.

Huntingdon, Hastings : Much good is being done by the holding of Farmers' Institutes. Strange to say, those who need instruction most are those who seldom or ever attend the Institutes or read agricultural journals. The greatest need of our farmers is education in methods of feeding and caring of stock. If every farmer could be got to read the bulletin recently issued by the Agricultural College on Farmyard Manure, it would make a great difference in the products of this locality.

Campbell and Carnarvon, Algoma : In order to make farming a success "Agriculture" should be compulsory in the rural public schools as the principal science taught.

GENERAL REMARKS.

FROM THE MAY RETURNS.

Zone, Kent: Bees have come through the winter well, and are strong for the time of year.

Yarmouth, Elgin: A great many farmers now house their cattle and keep them far more comfortable than usual, which is both a paying and a humane practice.

Yarmouth, Elgin: The maple sugar crop was only about half an average. There was no frost in March—not one rough day.

Seneca, Haldimand: I have never seen the land work better than this spring. Seed was put in in extra good order. Mostly all have sown some peas, but many are keeping the remainder to put in later, or, as they remark, "sow them in the moon," or rather in the full moon of May.

Bosauquet, Lambton: Farmers are improving immensely in their methods of feeding stock. Straw is no longer the important factor it used to be in wintering live stock. Hay is now extensively fed to horned cattle, and the greater part of the coarse grains are chopped and fed to stock.

Elderslie, Bruce: I may say that the production of pork has been greatly developed during the last year or two in this section. In fact, many of our farmers are going the "whole hog" into the industry. It will be all right so long as the demand keeps up. The attractions of the Northwest are calling off many of our young men, and farm help may soon be scarce.

Bentinck, Grey: Some are talking of growing the sugar beet this year.

Proton, Grey: In the thirty-four years I have lived here I never saw as much hay and straw kept over in the spring as there is this year.

Sarawak, Grey: More farmers will sow sugar beets, as the roots of last year turned out well.

Sunnidale, Simcoe: The method of feeding has greatly changed of late, and the change is for the better. Instead of feeding roots whole, or chopping them in chunks with a spade, endangering the lives of stock, they are all pulped and mixed with cut straw and meal; the straw all being cut and the grain crushed. Very little whole grain is fed now, as farmers have found out that it pays better to grind it.

Vespra, Simcoe: There has been an exodus of our young men to the Northwest.

Westminster, Middlesex: There is room for improvement in the value of dairy produce, although cheese is moving in that direction. Winter dairying cannot be a decided success if a ton of milk will not realize enough clear cash to purchase a ton of bran.

Zorra E., Oxford: Farm help is not so scarce as was at one time expected. The rush to the gold fields takes away very few who were of any use on a farm, or for that matter or anything else.

Maryborough, Wellington: Owing largely to the low prices of coarse grains during the past few years a great number of farmers are caring for their stock in a different manner from that pursued a few years ago. Many are feeding all the coarse grains grown on the farm, making beef, dairy products and pork.

Markham, York: The English sparrows are more numerous and, of course, more annoying and destructive, while our native birds are becoming less plentiful.

Amherst Island, Lennox and Addington: Farmers to-day are more given to what used to be called "book farming." They are going into silo building and feeding ensilage and meal to cows.

Leeds and Lansdowne, Leeds: Grain and corn are more liberally fed than in former years, and the condition of agriculture is better than last year; indeed, the prospects for the farmer are better than for years.

Osgoode, Carleton: Grain growing as a means of making money is done in these parts. Dairying and the raising of hogs are the principal things done by almost all our farmers.

Sidney, Hastings: Farm help is plentiful, although such a class of help as a good farmer would like to employ is not easily obtained.

Morrison, Muskoka: Patent fences are coming more into use, because they are rail-saving, and our rail timber is about all gone.

FROM THE NOVEMBER RETURNS.

Yarmouth, Elgin: Some Americans have started several evaporating factories here, and they are using up all the cull apples that before were marketed here.

Yarmouth, Elgin: Many of our best farmers are going more into stock farming, and a number in the vicinity of St. Thomas are devoting their whole time to supplying the city with milk, and are, generally, doing well at it.

Walsingham S., Norfolk: An evaporator began operations in September at Port Rowan, which buys apples at 20 cents a bushel, and it has awakened people to the need of spraying and taking care of the orchard.

Windham, Norfolk: It would be a great benefit if something could be done to clear the roadside of the weeds that grow there. The condition of affairs is a disgrace to the country at large and a curse to the farmer.

Canboro, Haldimand: We have a great drawback here in raising sheep. Whole flocks will be killed or wounded by dogs in a night. I think there should be a stricter law in regard to dogs. Most of the dogs are a nuisance. I think dogs away from their masters should be game.

Goderich, Huron : I have observed that draining makes a wonderful improvement in the yield of crops. I believe it would pay to thoroughly drain our farms every four rods apart.

Goderich, Huron : The farming industry is in a much more prosperous condition at present than it has been for some time. It might be better were there less combines.

Hay, Huron : I think the best method to kill weeds is to plow about three inches deep with a gang plow as soon as possible after the grain is off the field. Then harrow and let it lay until late in the fall when it should be plowed deep to turn in all the seed that has sprouted and grown.

Wawanosh W., Huron : Statute labor should be abolished. A road supervisor should be appointed, or say two in each township, men who will receive their appointment only after passing a thorough examination in roadmaking before a commission appointed by the Government, and who will be granted a diploma. We want good roads, but we must first have good men who know how to make good roads. The ordinary councillor is usually no better than the pathmaster. I believe there should also be a Government inspector of weeds, whose duty it would be to prosecute offenders, and thus protect and encourage those who are forever fighting weeds.

Greenock, Bruce : I have been growing kaffir corn this season for the first year. It does not grow so tall as most Indian or fodder corns, but it grows so stalky and leafy that the stalk of it is much heavier than those of other varieties. As a soiling or fodder crop I think it is as good, if not better, than most corns. Another thing in its favor is that it takes so little seed—the seed being small—and it is a good stooler. Cattle, and especially calves, are very fond of it. It also seems to be far less affected by the frost and drought.

Collingwood, Grey : Many have taken up clover growing, and they find it a profitable experiment, not only for the remuneration received for the seed, but from the enriching of the soil by turning under the second crop for wheat followed by roots.

Norwich N., Oxford : Could not our educational system be so changed as to make farmers instead of teachers, doctors, etc. ?

Maryborough, Wellington : Farmers are rapidly adopting improved methods in agriculture. In fact, the improvement is quite noticeable to anyone who has been familiar with farming during the last ten years. Better buildings are being erected, more care and taste are being exhibited in the arrangement of fields and the fences erected, and the cultivation of the soil is being attended to in a much more common sense and scientific manner than was in vogue a few years ago.

Mono, Dufferin : A severe frost occurred on the 2nd and 3rd of July, a thing that the oldest inhabitant cannot remember of before. In flat sections of the township most of the crops except fall wheat were frozen, and a good deal was plowed under. Potatoes suffered severely from the frost.

Trafalgar, Halton : The majority of farmers do not seed down often enough, although many are now adopting the three or four year rotation.

Gwillimbury N., York : There is a gradual and much needed change taking place in the system of farming in this township. The dairy, and the production of cattle, sheep and swine occupy the attention of farmers much more than formerly. The result is a decided swelling of the farmer's bank account, and an increase in the value of real estate.

Markham, York : The outlook for farming is better than for many years. Crops have been good and prices satisfactory.

Brock, Ontario : I think, on the whole, farming is improving. The close times are making us economize a little more. Farmers should raise a better class of live stock, and use nothing but pure-bred sires of all breeds, from the horse down to the hen.

Mara, Ontario : The condition of farmers in this township is far better to-day than it was ten years ago. They have turned their attention from grain growing to stock raising and dairying, which is a move in the right direction.

Mara, Ontario : There is more land seeded down to clover than formerly, which is, I think, an improvement, from the fact that it tends to keep the land in better order, and also prevents the spread of noxious weeds.

Pickering, Ontario : I am satisfied that red clover is the best crop a farmer can grow, not only as a paying crop in money, but it will enrich his land to such an extent that he will hardly know what to do with his barnyard manure. My farm is as rich as a garden on account of following this practice of growing clover.

Percy, Northumberland : At the present time there is every sign of a vast improvement and of prosperity in the farming industry. The land is better worked than ever before, and stock are also better cared for than in past years. Farmers are becoming awakened to the fact that in the past the land has only been half worked.

Sophiasburg, Prince Edward : Millet is grown in some quarters and is very much liked for improvement in milk production. It is also good for feeding horses while plowing. Most of the hop yards have been plowed up.

Hawkesbury E., Prescott : Hops were cultivated some years ago by many farmers but now few of them continue to do so. It seems that there is no profit in it.

Osgoode, Carleton : Some farmers grow millet to a considerable extent for feed. Flax is grown by a majority of farmers for home consumption, for the purpose of feeding calves. People are raising more calves this year than usual as there is a good demand for good cattle and bulls which are shipped to Buffalo, N.Y. I think it is a mistake to do so, for it would be better for the farmer to fatten them at home. Dairying and hog raising are the staple industries of this section.

Eldon, Victoria : As indicating the prosperity of the farmers of this township I may say that during the past season several comfortable farm dwellings have been erected, most of them of solid brick ; also several large barns with stone stabling underneath.

STATISTICS OF
THE WEATHER AND THE CROPS.

TABLE I.—Showing for each month the highest, lowest, mean highest, mean lowest and mean temperature at the principal stations in Ontario in 1898; also the annual mean for each station.

		Saugeen.	Birnam.	London.	Woodstock.	Stony Creek.	Toronto.	Lindsay.	Gravenhurst.	Ottawa.	Rockliffe.
		°	°	°	°	°	°	°	°	°	°
January....	Highest	37.9	50.9	49.5	48.0	57.0	44.9	37.9	36.1	39.0	34.0
	Lowest	-9.6	-7.0	-4.0	-11.0	-7.0	-14.4	-25.2	-31.0	-24.6	-40.0
	Mean highest	30.4	31.4	32.1	30.2	35.2	31.6	26.5	26.4	20.4	19.2
	Mean lowest	16.4	18.9	17.7	14.8	20.9	17.7	9.4	7.0	0.8	-5.2
	Monthly mean	23.4	25.2	24.9	22.5	28.1	25.4	18.0	16.7	10.6	7.0
February....	Highest	47.8	51.5	51.5	48.5	53.0	46.9	44.8	44.0	43.0	42.0
	Lowest	-6.7	-11.3	-8.5	-10.0	-10.0	-5.6	-17.1	-25.0	-20.5	-25.0
	Mean highest	29.8	30.2	30.7	30.1	33.8	30.9	28.6	28.8	26.8	26.4
	Mean lowest	16.5	19.0	16.9	15.6	18.3	17.2	11.5	11.1	11.1	6.5
	Monthly mean	23.1	24.6	23.8	22.9	26.0	24.6	20.1	19.9	19.0	16.4
March	Highest	59.3	67.0	66.5	63.8	68.0	61.7	58.2	54.0	57.0	58.0
	Lowest	3.2	2.1	6.0	0.8	8.0	9.0	2.5	-1.0	-1.2	-8.0
	Mean highest	43.8	45.9	47.2	45.5	48.3	44.4	44.5	42.9	42.4	44.0
	Mean lowest	26.6	28.4	27.6	28.0	29.6	29.0	24.9	23.9	25.0	20.1
	Monthly mean	35.2	37.2	37.4	36.7	38.9	36.3	34.7	33.4	33.7	32.0
April	Highest	61.9	67.5	68.0	65.0	69.0	67.9	69.6	68.0	71.0	72.0
	Lowest	13.9	14.1	12.5	14.7	20.0	15.7	7.2	8.0	12.3	6.0
	Mean highest	47.1	52.0	54.0	51.9	52.7	51.5	54.2	52.8	54.9	55.7
	Mean lowest	31.0	32.3	31.7	32.4	35.3	35.2	30.5	28.1	31.8	26.7
	Monthly mean	39.1	42.1	42.9	42.2	44.0	43.4	42.4	40.5	43.4	41.2
May	Highest	78.0	76.1	80.0	78.2	85.2	75.2	80.0	80.0	82.8	83.0
	Lowest	30.1	29.0	27.5	30.0	32.0	35.2	30.0	32.0	32.9	29.0
	Mean highest	61.7	64.6	68.0	65.8	67.0	65.5	67.5	66.6	67.7	68.4
	Mean lowest	42.8	45.9	45.0	43.8	46.2	46.6	44.7	43.9	46.9	43.0
	Monthly mean	52.2	55.7	56.5	54.8	56.6	55.0	56.1	55.3	57.3	55.7
June	Highest	88.0	90.1	90.0	88.0	93.0	90.5	85.5	87.0	86.9	87.0
	Lowest	42.6	43.2	36.5	42.0	45.0	44.6	42.8	42.0	45.1	36.0
	Mean highest	72.5	77.3	79.4	76.5	79.0	76.0	76.5	76.7	76.8	75.1
	Mean lowest	54.0	55.9	53.9	53.2	58.4	56.5	54.3	53.4	55.6	51.8
	Monthly mean	63.3	66.7	66.6	64.9	68.7	65.4	65.5	65.1	66.2	63.4
July	Highest	90.5	98.0	98.0	95.5	98.0	95.5	93.5	91.0	95.0	92.0
	Lowest	39.2	38.0	37.2	37.0	38.0	42.1	36.8	33.0	41.0	37.0
	Mean highest	77.4	83.6	85.6	83.1	85.9	83.0	84.1	84.3	83.0	81.6
	Mean lowest	57.3	54.2	57.1	55.0	61.2	60.1	56.3	56.5	58.2	54.4
	Monthly mean	67.4	70.6	71.4	69.0	73.6	70.5	70.2	70.4	70.6	68.0
August....	Highest	84.4	94.0	93.5	88.3	99.0	96.0	90.0	89.0	85.0	81.0
	Lowest	45.2	44.5	42.0	43.5	44.0	46.5	42.0	41.0	42.6	40.0
	Mean highest	74.0	76.1	80.2	77.3	85.6	81.8	80.0	77.2	77.5	74.4
	Mean lowest	57.5	58.7	56.6	55.9	59.7	59.8	56.3	55.6	57.5	54.5
	Monthly mean	65.7	67.4	68.4	66.8	72.6	69.7	68.1	66.4	67.5	64.4
September..	Highest	91.2	92.2	93.0	87.5	100.0	97.1	91.7	91.0	90.0	87.0
	Lowest	36.1	35.0	32.5	32.0	37.8	33.0	32.0	31.0	33.2	35.0
	Mean highest	72.1	73.1	74.6	71.6	77.6	73.9	71.8	70.8	72.3	70.1
	Mean lowest	53.9	54.8	51.7	50.3	52.8	54.6	50.5	49.7	49.8	47.0
	Monthly mean	63.0	63.9	63.2	61.0	63.5	62.8	61.1	60.3	61.0	58.6
October	Highest	79.0	83.3	84.0	80.2	89.0	82.0	79.6	80.0	77.1	76.0
	Lowest	25.6	27.3	23.5	23.0	26.0	26.6	24.9	25.0	26.0	25.0
	Mean highest	56.7	57.0	58.1	55.8	61.1	58.5	54.9	55.1	54.1	52.8
	Mean lowest	41.5	45.9	41.9	39.9	43.2	43.4	39.8	39.6	39.2	37.3
	Monthly mean	49.1	51.4	50.0	47.9	52.2	50.3	47.3	47.3	46.6	45.1
November..	Highest	64.0	64.9	63.0	62.0	67.0	58.0	58.6	57.0	60.0	62.0
	Lowest	11.5	8.7	4.8	7.0	11.0	8.0	4.4	10.0	6.5	5.0
	Mean highest	42.6	42.1	42.9	41.9	46.2	43.6	41.0	40.6	40.2	40.1
	Mean lowest	30.5	30.6	27.7	25.7	31.0	28.5	26.5	27.6	25.2	23.8
	Monthly mean	36.6	36.4	35.3	33.8	38.6	36.1	33.7	34.1	32.7	31.9
December..	Highest	44.0	44.8	46.0	45.0	48.0	44.8	40.6	40.0	40.7	40.0
	Lowest	-1.0	1.5	4.5	-6.2	-8.0	-5.2	-15.7	-17.0	-23.3	-22.0
	Mean highest	31.7	29.9	31.1	31.0	34.4	32.9	28.9	29.1	26.4	23.4
	Mean lowest	19.7	20.4	18.1	16.8	22.2	19.8	12.6	11.7	9.2	6.1
	Monthly mean	25.7	25.2	24.6	23.9	28.3	26.2	20.8	20.4	17.8	14.7
Annual mean		45.32	47.20	47.08	45.53	49.26	47.15	44.83	44.15	43.87	41.53

TABLE II. Showing for each month the annual average of the highest, lowest, mean highest, mean lowest, and mean temperature at the principal stations in Ontario derived from the seventeen years 1882-98; also the annual mean at each station for the same period.

		Saugeen.	Eirnam.	London.	Woodstock.	Stony Creek.	T. onto.	Lindsay.	Gravenhurst.	Ottawa.	Rockliffe.
January....	Highest	44.8	46.7	46.9	46.7	51.7	44.5	41.5	41.8	40.0	37.4
	Lowest	-7.9	-10.0	-9.5	-12.7	-4.7	-8.4	-21.9	-27.7	-22.9	-33.5
	Mean highest	27.6	26.5	28.1	27.5	32.7	28.2	23.8	23.5	19.1	18.0
	Mean lowest	12.7	13.9	13.3	10.4	18.9	13.5	5.9	3.6	0.9	-6.1
	Monthly mean	20.2	20.2	21.8	20.3	22.6	21.4	15.2	14.3	10.6	6.1
February....	Highest	44.9	47.2	46.4	45.7	48.2	44.3	42.6	43.0	40.2	42.0
	Lowest	-10.7	-12.5	-10.8	-12.0	-6.3	-8.4	-18.0	-24.6	-22.4	-33.9
	Mean highest	28.2	27.8	29.3	29.1	33.0	29.3	26.1	25.9	22.0	22.1
	Mean lowest	11.8	13.9	13.3	11.0	17.8	13.7	6.2	4.7	2.9	2.1
	Monthly mean	19.6	20.9	22.1	21.4	24.0	22.0	16.5	15.9	13.1	8.9
March	Highest	52.2	56.8	56.6	55.4	58.3	52.4	49.3	48.8	46.0	50.0
	Lowest	-4.9	-4.8	-3.1	-4.5	-4.5	-2.9	-8.6	-14.9	-10.2	-24.2
	Mean highest	34.0	35.2	36.4	35.7	40.1	35.1	33.1	33.1	31.5	32.4
	Mean lowest	17.0	19.7	19.1	17.5	25.0	20.6	14.8	11.9	13.4	6.1
	Monthly mean	24.8	27.1	28.6	27.3	30.7	28.0	23.7	22.9	22.7	19.4
April	Highest	73.2	76.9	75.9	75.4	77.5	70.4	74.1	69.9	73.1	74.0
	Lowest	13.6	16.5	18.1	16.4	23.2	20.4	12.2	10.2	12.6	5.0
	Mean highest	49.3	52.7	52.5	52.9	54.2	50.3	51.6	49.4	50.4	50.5
	Mean lowest	30.8	33.4	32.1	31.4	36.6	33.3	29.9	28.4	30.3	25.6
	Monthly mean	39.3	43.1	44.4	42.7	43.9	41.7	40.2	39.0	40.8	37.5
May	Highest	79.5	82.3	81.7	80.8	83.6	77.5	82.0	81.1	82.9	85.2
	Lowest	28.7	28.7	30.3	29.1	35.1	32.5	28.8	28.1	31.0	25.1
	Mean highest	60.7	65.4	65.9	64.5	65.8	62.2	65.3	63.6	66.0	65.5
	Mean lowest	40.9	43.5	43.9	41.9	45.9	43.6	41.6	41.8	43.9	38.6
	Monthly mean	50.2	54.5	56.2	54.0	54.8	52.8	53.2	52.6	55.4	51.7
June	Highest	85.2	88.3	87.8	87.7	91.6	86.4	89.0	87.7	88.6	89.8
	Lowest	37.4	37.0	38.8	38.4	44.2	42.8	38.5	37.2	41.6	34.4
	Mean highest	71.0	76.5	76.4	76.3	78.7	73.8	76.5	75.1	76.2	75.9
	Mean lowest	50.8	53.3	53.8	52.0	57.6	53.9	51.5	51.6	54.1	48.0
	Monthly mean	60.6	64.9	66.5	65.1	66.6	63.8	63.9	63.5	65.6	61.8
July	Highest	87.4	92.2	91.1	90.7	95.3	89.8	91.9	89.6	91.3	91.4
	Lowest	42.1	41.4	43.9	43.3	49.1	47.4	42.4	42.9	47.0	40.9
	Mean highest	78.3	80.2	79.7	79.8	83.2	78.0	80.0	78.4	79.1	78.2
	Mean lowest	54.9	55.9	56.7	54.7	60.8	57.9	54.3	55.3	57.3	52.9
	Monthly mean	64.5	68.2	69.9	68.2	71.1	67.9	66.9	66.9	68.5	64.8
August....	Highest	86.3	90.8	89.7	89.7	92.9	87.4	90.1	88.2	88.7	88.4
	Lowest	41.0	40.3	39.8	40.5	46.6	45.8	38.8	39.8	42.4	38.1
	Mean highest	73.4	76.8	77.0	77.3	80.8	75.6	77.3	75.7	75.8	74.7
	Mean lowest	54.3	54.4	53.9	50.5	58.8	56.5	52.5	53.2	54.4	50.8
	Monthly mean	65.9	65.4	66.8	65.2	69.4	65.8	64.1	63.9	65.4	61.1
September..	Highest	85.1	87.4	86.4	86.8	90.7	84.3	86.6	84.0	84.7	84.8
	Lowest	32.8	32.4	31.3	30.6	36.3	36.6	30.1	30.8	31.9	29.6
	Mean highest	68.3	70.9	71.0	70.5	74.4	68.7	69.6	68.9	68.4	67.8
	Mean lowest	48.9	49.9	49.1	46.5	53.1	50.1	45.9	46.6	47.1	43.4
	Monthly mean	57.5	60.5	60.7	59.1	62.1	59.4	57.0	57.2	57.7	53.5
October	Highest	73.4	76.0	74.7	74.4	76.0	71.6	73.4	71.9	70.2	72.3
	Lowest	24.1	23.8	23.6	22.8	26.9	26.2	20.4	21.8	22.8	18.9
	Mean highest	55.4	56.2	56.4	55.7	59.9	54.8	54.4	54.9	52.9	52.3
	Mean lowest	38.6	39.5	37.6	35.9	41.2	39.3	35.2	36.5	35.5	33.0
	Monthly mean	45.8	47.8	47.6	46.3	49.1	47.3	43.9	44.7	44.4	41.4
November..	Highest	61.7	63.5	62.3	62.0	65.8	59.0	59.7	59.7	57.9	56.8
	Lowest	12.7	12.2	11.4	9.5	16.5	13.6	4.1	6.7	4.8	1.2
	Mean highest	43.0	42.5	43.7	42.6	46.8	42.9	40.3	40.7	38.5	36.9
	Mean lowest	29.6	30.4	29.1	27.2	32.5	30.2	25.6	25.7	24.8	21.9
	Monthly mean	36.5	36.5	36.7	35.6	39.2	36.7	32.7	33.1	32.0	29.0
December ..	Highest	50.4	49.6	51.1	49.2	54.5	47.8	44.9	45.0	42.5	42.0
	Lowest	-0.8	-2.5	-2.8	-4.5	0.9	-2.2	-14.0	-13.8	-17.2	-24.0
	Mean highest	33.4	32.3	33.7	32.6	36.9	33.7	29.3	29.6	25.1	24.6
	Mean lowest	20.8	21.1	20.2	17.9	23.9	20.8	13.5	13.6	8.9	5.3
	Monthly mean	27.0	26.7	27.6	26.1	30.4	27.7	21.9	22.3	17.5	14.8
Annual mean		42.57	44.65	45.74	44.27	46.99	44.54	41.60	41.36	41.14	37.50

TABLE III.—Monthly summary of bright sunshine at the principal stations in Ontario in 1898, showing the number of hours the sun was above the horizon, the hours of registered sunshine, the total for the year, and the average derived from the seventeen years 1882-98.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.
Hours of sun above horizon	285.7	291.4	369.9	406.4	461.1	465.7	470.9	434.5	376.3	340.2	286.9	274.3	4463.3
Woodstock { 1898...	63.1	63.4	81.0	215.1	175.0	199.1	301.1	221.5	173.7	106.9	80.0	47.2	1727.1
{ 1882-98	59.6	82.6	131.0	181.0	203.9	239.7	272.9	233.9	185.6	129.7	66.2	54.4	1840.5
Toronto { 1898...	74.9	72.8	170.2	237.8	216.6	259.9	323.1	239.2	227.7	140.2	95.9	70.6	2128.9
{ 1882-98	76.1	98.8	159.4	198.6	219.2	259.5	282.6	251.3	216.2	144.1	76.0	60.9	2042.7
Barrie { 1898...	64.5	57.5	167.7	246.8	203.2	241.6	314.8	242.1	205.0	99.4	81.8	42.6	1967.0
{ 1882-98	53.2	75.6	110.5	180.1	199.3	232.9	260.8	222.2	173.1	111.7	47.5	41.7	1738.6
Lindsay { 1898...	77.7	60.4	175.9	164.4	205.0	234.1	291.6	225.8	209.3	119.0	84.1	54.8	1900.1
{ 1882-98	73.6	97.7	164.4	205.0	215.7	254.7	270.7	245.4	202.7	134.1	66.2	57.0	1987.2
Kingston { 1898...	101.0	92.4	192.7	212.5	187.9	250.9	307.9	199.5	196.3	125.6	103.0	67.8	2037.5
{ 1882-98	74.5	103.6	165.2	196.8	217.8	249.1	270.4	245.3	196.9	135.3	73.7	70.4	1999.0
Average of five stations { 1898...	76.2	69.3	157.5	230.2	196.3	237.1	307.8	225.2	202.4	118.2	89.0	56.6	1965.8
{ 1897...	70.4	93.7	148.3	174.2	196.9	219.8	258.7	262.4	237.1	161.0	60.8	40.6	1923.9
{ 1882-98	67.4	91.7	152.1	192.3	211.2	247.2	271.5	239.6	194.9	131.0	65.9	56.9	1921.7

TABLE IV.—Monthly summary of inches of rain and snow precipitation in the several districts of Ontario in 1898; also the average derived from the seventeen years 1882-1898.

Districts.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total for the year.
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
<i>West and Southwest:</i>													
Rain { 1898.....	2.11	0.76	2.81	2.08	2.20	3.14	1.39	2.36	2.94	5.02	2.22	1.16	28.19
{ 1882-98.....	1.19	1.41	1.25	1.85	3.38	3.13	2.55	2.62	2.58	2.79	2.50	1.58	26.83
Snow { 1898.....	14.4	17.2	0.6	1.0	...	...	...	...	...	0.1	6.3	19.0	58.6
{ 1882-98.....	16.3	12.3	8.9	2.7	0.1	...	...	...	...	0.3	6.8	13.4	60.8
<i>Northwest and North:</i>													
Rain { 1898.....	0.70	0.41	2.55	1.17	2.59	3.03	1.07	3.03	2.66	4.12	1.64	0.38	23.35
{ 1882-98.....	0.90	0.58	0.88	1.45	2.59	2.74	2.58	2.88	2.92	2.94	2.03	1.08	23.57
Snow { 1898.....	23.3	21.8	2.9	2.3	...	...	...	...	...	0.5	9.8	34.4	95.0
{ 1882-98.....	27.7	21.2	13.3	3.8	0.4	...	...	...	...	1.8	13.8	21.7	103.7
<i>Centre.</i>													
Rain { 1898.....	1.98	0.70	2.22	1.47	2.37	2.80	0.92	1.85	3.07	4.87	1.61	0.79	24.65
{ 1882-98.....	1.17	1.08	1.17	1.57	2.81	2.80	2.34	2.33	2.34	2.36	2.29	1.44	23.70
Snow { 1898.....	16.1	18.6	0.3	1.6	...	...	...	...	...	...	12.8	25.1	74.5
{ 1882-98.....	18.1	14.5	9.0	3.0	0.1	...	...	...	...	0.5	6.1	12.1	63.4
<i>East and Northeast:</i>													
Rain { 1898.....	1.10	0.52	2.10	1.08	2.54	2.36	1.06	3.30	3.09	4.40	1.22	0.62	23.39
{ 1882-98.....	0.91	0.66	0.95	1.34	2.63	2.61	2.71	2.65	2.35	2.19	1.91	1.12	22.03
Snow { 1898.....	19.1	17.8	0.1	1.2	...	...	...	...	...	1.0	9.5	19.9	68.6
{ 1882-98.....	21.6	18.6	12.3	3.7	0.2	...	...	...	...	0.7	8.5	14.3	79.9
<i>The Province:</i>													
Rain { 1898.....	1.47	0.60	2.42	1.45	2.43	2.83	1.11	2.64	2.94	4.60	1.67	0.74	24.90
{ 1882-98.....	1.04	0.93	1.06	1.55	2.85	2.82	2.55	2.62	2.55	2.57	2.18	1.31	24.03
Snow { 1898.....	18.2	18.9	1.0	1.5	...	...	...	...	...	0.4	9.6	24.6	74.2
{ 1882-98.....	20.9	16.7	10.9	3.3	0.2	...	...	...	...	0.8	8.8	15.4	77.0

TABLE V. Summary of the total fall of rain and snow, and the number of days on which rain or snow fell in Ontario during the years 1897-98, at stations reporting for the whole year, and the average for the Province.

Station.	Observer.	Rain.				Snow.			
		1897.		1898.		1897.		1898.	
		Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.
ESSEX :									
Cottam	S. G. Brooker	32.94	99	33.45	96	27.8	21	35.3	21
Windsor	G. R. Anderson	30.26	118	32.03	116	42.9	51	30.0	34
KENT :									
Dealtown	S. J. Pardo	28.15	90	31.33	88	21.6	25	33.1	23
Chatham	R. C. Burt	29.46	87	30.39	90	41.2	24	42.8	28
ELGIN :									
Cowal	S. Maccoll	32.24	63	28.21	49	30.0	16	56.5	18
Port Stanley	M. Payne	28.34	124	30.73	114	61.3	64	87.7	59
NORFOLK :									
Port Dover	J. L. Morgan	33.45	129	25.28	108	64.3	47	80.2	39
WELLAND :									
Welland	J. A. Gilchreese ..	34.55	91	31.49	89	72.0	29	137.5	32
LINCOLN :									
St. Ann's	G. A. Snyder	30.93	88	20.85	72	48.4	59	100.9	51
Niagara	J. DeW. Randall ..	29.33	85	25.11	87	44.0	27	54.3	18
LAMBTON :									
Sarnia	Wm. Mowbray	24.67	60	17.77	51	38.0	19	45.5	19
Birnam	J. S. Mellor	31.37	87	32.45	77	55.0	42	104.2	43
Wyoming	J. Osborne	27.55	68	26.84	62	34.0	15	60.0	19
HURON :									
Goderich, L. H. ...	R. Campbell	20.03	57	22.49	63	81.0	32	99.5	32
Sunshine	G. Hood	30.37	96	28.59	76	105.3	66	107.3	50
BRUCE :									
Lucknow	M. Macdonald	28.66	120	28.22	94	122.4	75	98.4	72
N. Bruce	J. B. Muir	32.53	117	28.78	98	75.0	65	79.7	66
Point Clark	M. Macdonald	26.69	51	21.54	54	58.7	25	74.7	48
Saugeen	Mrs. J. R. Stewart ..	27.26	112	20.03	91	131.5	88	108.7	86
GREY :									
Bognor	J. A. McPherson ..	36.86	103	25.21	70	170.5	70	107.0	48
Owen Sound	J. R. Mackenzie ..	33.29	117	25.19	105	168.2	67	165.0	57
Durham	J. Gunn, M.D.	30.07	85	26.26	79	179.0	65	155.0	62
SIMCOE :									
Barrie	W. H. Buttery	28.27	117	21.37	91	162.6	76	101.1	78
Coldwater	J. B. Lazonby	26.02	74	21.53	81	149.2	61	125.9	49
Orillia	H. A. Fitton	31.66	100	20.21	80	121.0	63	88.0	59
MIDDLESEX :									
Coldstream	C. Zavitz	27.25	94	31.39	82	77.7	41	68.5	28
London	J. S. Dewar	30.07	102	34.78	110	49.0	72	95.7	60
Hubrey	H. Anderson	25.17	62	27.67	71	33.0	27	54.5	28
OXFORD :									
Princeton	D. Beamer	27.20	67	25.51	58	57.0	38	77.5	35
Woodstock	Woodstock College.	27.13	80	26.12	72	32.0	28	52.1	31
BRANT :									
Paris	John Kay	29.80	87	29.94	87	41.5	23	50.5	21
St. George	Dr. Kitchen	32.78	65	28.19	64	71.2	37	64.8	20
Brantford	A. N. Ashton	26.47	64	28.99	55	32.3	16	59.7	21
PERTH :									
St. Mary's	J. Thompson	27.37	93	29.51	84	94.0	50	80.0	36
Stratford	Wm. Dick	29.91	98	33.27	94	93.2	49	96.2	58
WELLINGTON :									
Mount Forest	W. E. Brooks	27.66	109	17.51	89	106.5	72	117.5	86
Erasmus	G. Wood	29.73	118	21.89	80	83.5	99	86.7	94
DUFFERIN :									
Orangeville	N. Gordon	38.09	80	34.36	79	104.8	48	100.5	44

TABLE V.—*Concluded.*

Station.	Observer.	Rain.				Snow.			
		1897.		1898.		1897.		1898.	
		Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.
WENTWORTH:									
Stony Creek.....	C. F. VanWagner ..	33.66	81	25.37	74	29.0	28	89.3	27
Hamilton	Rev. Canon Bland ..			24.25	89			56.2	25
HALTON:									
Georgetown	J. Barber	26.36	114	29.07	98	93.8	70	93.4	59
YORK:									
Aurora	Rev. R. W. Amos..	24.06	77	24.04	69	68.2	41	67.4	40
Scarboro	R. Martin	29.10	92	20.75	79	33.9	56	52.1	39
Deer Park	J. Reeve	20.76	79	21.05	69	39.7	28	56.5	24
Toronto	Observatory	27.74	110	23.82	98	47.4	43	71.3	53
ONTARIO:									
Stouffville	T. Smyth	28.64	85	25.87	85	93.6	47	85.1	42
PEEL:									
Alton	W. J. Dodds	24.70	104	21.90	85	50.6	36	63.3	43
FRONTENAC:									
Kingston	A. P. Knight, M.A.	22.86	98	27.08	107	54.6	73	44.2	58
CARLETON:									
Ottawa	W. T. Ellis	23.98	99	24.96	102	90.5	62	110.6	58
RENFREW:									
Clontarf	A. Schultz	22.04	89	20.71	90	119.0	52	121.6	46
Rockliffe	C. McIntyre	25.10	100	26.56	95	94.0	66	59.7	53
Renfrew	H. Wright	13.50	44	19.76	40	52.0	21	64.5	20
LANARK:									
Oliver's Ferry	W. J. McLean ...	20.37	66	24.33	53	48.0	20	57.0	18
VICTORIA:									
Lindsay	Thomas Beall	30.69	102	28.66	94	116.4	67	85.0	49
PETERBOROUGH:									
Ennismore	J. N. Telford	25.09	68	24.55	52	81.0	29	85.5	22
Peterborough	W. Peters	28.07	113	25.87	96	79.2	60	74.9	54
Lakefield	H. A. Lempiere ..	29.01	111	28.71	84	86.2	44	74.0	38
HALIBURTON:									
Haliburton	C. R. Stewart	35.58	90	22.50	87	77.7	59	54.3	39
HASTINGS:									
Bancroft	J. Cleak	31.76	73	24.18	66	129.2	57	75.4	38
Deseronto	J. Russell	36.73	100	33.15	102	77.1	47	68.4	45
MUSKOKA:									
Bala	E. B. Sutton	36.74	87	27.24	80	110.1	79	136.0	61
Beatrice	J. Hollingworth ..	36.33	94	30.58	71	113.5	58	123.5	42
Gravenhurst	T. M. Robinson ..	35.92	89	25.45	79	106.8	65	100.7	60
Huntsville	C. A. Wattson	31.85	67	26.37	61	86.5	37	89.0	35
PARRY SOUND:									
Farry Sound	Rev. R. Mosely ...	32.69	122	27.53	102	135.9	77	124.6	77
Sprucedale	A. Kirkham	33.72	81	25.41	74	101.0	34	119.0	39
Uplands	P. Macdonald	39.03	105	26.42	79	144.5	73	128.6	67
ALGOMA:									
Port Arthur	W. P. Cook	20.97	73	26.23	77	35.4	44	19.1	37
Savanne	Agent C.P.R.	17.10	26	27.70	48	67.0	31	64.0	28
White River	G. E. Whitehead ..	10.03	59	19.33	98	75.4	104	85.2	114
Thompson	Thomas Baker	23.31	35	20.94	42	57.0	43	61.8	22
Average for the Province.....		28.59	88	26.05	81	79.5	49	82.3	44

TABLE VI. Comparative Meteorological Register for the seven years 1892-98, at Toronto Observatory, in Latitude 43° 39.4' N., and Longitude 5h. 17m. 34.65s. W. Height above the sea 350 feet.

	1898.	1897.	1896.	1895.	1894.	1893.	1892.
Average temperature	47.15	45.93	45.36	44.28	46.75	43.53	44.61
Difference from average (58 years)	+ 2.89	+ 1.67	+ 1.10	+ 0.02	+ 2.49	- 0.73	+ 0.35
Thermic anomaly (Lat. 43° 40')	- 3.87	- 5.09	- 5.66	- 6.74	- 4.27	- 7.49	- 6.41
Highest temperature	97.1	93.3	91.3	93.4	90.7	93.3	93.5
Lowest temperature	-15.0	-7.2	-17.9	-21.2	-9.9	-17.8	-10.2
Annual ranges	112.1	100.5	104.2	114.6	100.6	111.1	103.7
Average daily range	17.48	16.21	17.58	17.26	16.27	17.15	15.58
Greatest daily range	34.4	36.0	38.9	36.9	34.3	36.3	38.6
Average height of barometer at 32° Fahr.	29.6216	29.6319	29.6382	29.6171	29.6246	29.5996	29.6325
Difference from average (57 years)	+ .0021	+ .0124	+ .0187	- .0024	+ .0051	- .0199	+ .0130
Highest barometer	30.218	30.353	30.422	30.240	30.516	30.467	30.356
Lowest barometer	28.732	28.779	28.734	28.746	29.035	28.227	28.846
Annual ranges	1.486	1.574	1.688	1.494	1.481	2.240	1.510
Average humidity of the air	76	76	75	75	76	77	77
Difference from average	0	0	- 1	- 1	0	+ 1	+ 1
Average elasticity of aqueous vapour	0.289	0.274	0.254	0.253	0.277	0.262	0.272
Average temperature of dew point	44.1	42.7	38.9	41.3	42.9	41.5	42.5
Average of cloudiness	0.58	0.61	0.60	0.57	0.60	0.59	0.61
Difference from average (44 years)	- .03	.00	- .01	- .04	- .01	- .02	.00
Resultant direction of wind	N 65 W	N 89 W	N 88 W	N 78 W	N 78 W	N 66 W	N 54 W
Resultant velocity of wind	1.78	2.42	0.75	1.36	1.10	1.96	1.81
Average velocity (miles per hour)	10.12	12.33	8.44	5.60	5.67	8.59	8.17
Highest velocity in month and year	55.0	51.0	50.0	60.0	58.0	60.0	44.0
Total amount of rain in inches	23.800	27.737	21.770	22.532	25.785	31.145	25.285
Difference from average (58 years)	-3.406	+0.531	-5.436	-4.674	-1.421	+3.939	-1.921
Number of days of rain	98	110	104	101	114	105	119
Total amount of snow in inches	71.3	47.4	73.3	54.8	37.8	85.7	42.2
Difference from average (58 years)	+ 3.32	-20.58	+ 5.32	-13.18	-30.18	+17.72	-25.78
Number of days of snow	53	43	43	48	32	64	43
Number of fair days	196	173	174	196	179	156	165
Number of days completely clouded	56	58	55	48	43	50	57
Number of auroras observed	7	3	18	11	23	18	33
Possible to see aurora (No. of nights)	210	179	194	195	199	208	195
Number of thunderstorms	34	19	25	23	36	41	40
Number of fogs	26	28	30	33	30	31	36
Number of hours of bright sunshine	2128.9	1987.6	2146.7	2159.7	2017.7	2052.4	2054.4
Number of hours of possible sunshine	4463.3	4463.3	4474.4	4463.3	4463.3	4463.3	4474.4

TABLE VII. Annual Summary for the year 1898 at Haileybury, Lake Temiscamingue, Latitude 47° 29' N., Long. 79° 39' W. Height above sea, 687 feet.

Month.	Temperature.					Wind, direction from.								Force of wind.		Amount of cloud.		Rain.		Snow.		Fogs.	Thunder.	Aurora.
	8 a. m.	8 p. m.	Mean.	Max.	Min.	Mean daily range.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	C.	S. a. m.	8 p. m.	Amount.	Days and over 0.1.	Amount.	Days.			
January	4.72	9.22	7.48	39.7	-36.2	24.1	4	2	1	4	6	4	11	14	16	1.6	1.2	in.	.....	13.1	18	4	.....	6
February	7.99	15.25	13.47	42.9	30.0	20.0	10	6	...	4	6	6	2	9	13	1.3	1.5	0.75	3	25.1	16	2	1	5
March	24.01	30.26	29.53	56.0	-8.6	21.7	1	1	3	6	10	8	11	16	6	1.9	1.6	1.40	9	6.1	13	6	2	12
April	32.03	37.87	38.03	67.0	1.2	25.4	19	1	2	5	5	2	6	14	6	1.2	1.5	0.39	3	1.7	6	2	.....	15
May	49.76	52.61	53.13	78.8	24.8	23.2	7	8	...	3	12	3	4	10	15	1.6	1.1	3.86	15	*	1	2	1	3
June	58.62	61.94	61.35	88.3	33.0	21.7	15	4	1	7	7	7	5	4	10	1.8	1.4	5.55	13	.....	.....	6	.....	1
July	64.36	66.51	66.74	89.8	37.8	21.3	15	4	1	2	10	17	6	2	6	2.2	1.5	2.16	14	.....	.....	6	.....	6
August	60.27	60.67	61.62	80.8	41.0	18.4	8	5	2	3	5	6	14	8	11	1.7	1.2	4.37	19	.....	.....	2	1	9
September	54.16	56.23	57.89	85.8	31.7	18.7	3	1	...	3	10	10	13	9	11	1.6	1.6	3.61	21	.....	.....	3	3	8
October	39.83	40.51	42.33	76.5	16.0	15.7	9	9	2	2	19	7	8	5	1	2.3	2.3	2.71	10	14.0	6	6	.....	1
November	27.82	29.05	29.69	61.5	0.2	15.0	6	3	2	4	16	9	7	9	4	2.1	1.8	0.63	6	5.0	11	7	1	5
December	8.99	11.32	10.84	37.1	-34.3	19.5	8	...	1	3	12	6	12	6	14	1.5	1.1	0.10	1	23.3	24	1	.....	1
1898.....	36.05	39.29	39.31	89.8	-36.2	20.4	105	41	15	45	118	85	99	105	112	1.7	1.5	25.56	114	88.3	95	47	10	76
1897	35.10	37.79	37.76	96.5	-34.0	20.0	95	33	20	49	113	61	108	135	117	1.6	1.4	23.93	106	107.5	75	13	11	63
1896	34.31	36.14	36.74	92.7	-40.2	20.7	77	21	31	77	92	68	117	127	119	1.7	1.5	23.40	112	87.6	87	22	8	83

RURAL AREA.

TABLE VIII. Showing by County Municipalities and groups of Counties the Rural Area of Ontario as returned by municipal assessors for 1898.

Counties.	Acres of assessed land.			Acres cleared.		Acres woodland.	Acres swamp or marsh.	Per cent. cleared.
	Resident.	Non-resident	Total occupied.	1898.	1897.			
Essex	427,713	2,431	430,144	270,502	265,337	147,084	12,558	62.9
Kent	562,792	4,691	567,483	404,341	369,934	142,304	20,833	71.3
Elgin	434,624	638	435,262	323,334	318,341	103,195	8,733	74.3
Norfolk	394,851	3,126	397,977	256,206	253,126	109,503	32,274	64.4
Haldimand	275,747	4,476	280,223	225,990	225,557	48,317	5,916	80.6
Welland	223,559	3,569	227,128	182,283	177,590	32,691	12,154	80.3
Totals	2,319,286	18,931	2,338,217	1,662,650	1,609,885	583,094	92,473	71.1
Lambton	654,931	6,986	661,917	384,903	374,040	234,529	42,485	58.1
Huron	796,518	1,697	798,215	610,561	607,548	99,646	88,008	76.5
Bruce	844,757	21,907	866,664	510,200	505,470	224,620	131,844	58.9
Totals	2,296,206	30,590	2,326,796	1,505,664	1,487,058	558,795	262,337	64.7
Grey	1,051,363	9,269	1,060,632	635,236	620,072	217,392	208,004	59.9
Simcoe	925,351	36,463	961,814	562,004	569,150	296,595	103,215	58.4
Totals	1,976,714	45,732	2,022,446	1,197,240	1,189,222	513,987	311,219	59.2
Middlesex	753,606	3,881	757,487	581,985	574,559	161,868	13,634	76.8
Oxford	471,676	831	472,507	368,159	366,181	71,899	32,449	77.9
Brant	213,044	2,668	215,712	176,578	180,532	16,017	23,117	81.9
Perth	512,252	6,198	518,450	413,365	406,865	60,479	44,606	79.7
Wellington	626,746	888	627,634	468,391	465,314	67,302	91,941	74.6
Waterloo	303,166	3,403	306,569	247,029	244,305	39,485	20,055	80.6
Dufferin	352,303	3,907	356,210	233,979	228,932	48,199	74,032	65.7
Totals	3,232,793	21,776	3,254,569	2,489,486	2,466,688	465,249	299,834	76.5
Lincoln	184,131	7,227	191,358	161,714	161,412	29,042	602	84.5
Wentworth	267,987	4,644	272,631	214,012	213,907	36,596	22,023	78.5
Halton	220,462	4,396	224,858	169,745	169,887	31,129	23,984	75.5
Peel	284,006	4,227	288,233	247,791	246,123	27,087	13,355	86.0
York	532,967	3,503	536,470	428,325	424,952	52,331	55,819	79.8
Ontario	489,362	9,173	498,535	357,786	355,007	44,706	96,043	71.8
Durham	368,177	3,064	371,241	291,415	290,155	42,897	36,929	78.5
Northumberland	431,756	3,374	435,130	336,703	337,975	54,015	44,412	77.4
Prince Edward	222,204	10,303	232,507	194,937	191,731	22,365	15,205	83.8
Totals	3,001,052	49,916	3,050,968	2,402,428	2,391,149	340,168	308,372	78.7
Lennox and Addington	430,235	9,195	439,430	256,349	236,325	99,927	83,154	58.3
Frontenac	612,612	75,087	687,699	253,012	252,868	218,013	216,674	36.8
Leeds	480,952	9,387	470,339	272,474	270,082	190,424	77,441	57.9
Grenville	269,990	1,059	271,049	169,409	170,459	86,840	64,800	62.5
Dundas	235,801	1,000	236,801	145,920	147,779	50,491	40,390	61.6
Stormont	245,995	2,472	248,467	132,443	133,733	104,400	11,624	53.3
Glengarry	290,139	3	290,142	180,632	180,147	98,047	11,463	62.3
Prescott	267,345	20,235	287,580	161,824	157,558	115,901	9,855	56.3
Russell	231,969	18,996	250,965	96,291	92,968	143,419	11,255	38.4
Carleton	559,901	5,562	565,463	309,183	308,092	88,122	168,158	54.7
Renfrew	918,642	36,067	954,709	299,094	305,332	471,922	183,693	31.3
Lanark	654,871	21,790	676,661	309,782	307,051	199,871	167,008	45.8
Totals	5,178,452	200,853	5,379,305	2,586,413	2,562,394	1,747,377	1,045,515	48.1
Victoria	5,16,078	48,146	5,242,224	268,830	268,067	135,167	190,227	45.2
Peterborough	545,516	22,299	567,805	243,571	245,556	219,175	105,059	42.9
Haliburton	554,219	14,866	569,085	35,460	35,443	495,292	33,333	6.2
Hastings	926,780	96,890	1,023,670	384,140	380,634	437,482	202,048	37.5
Totals	2,572,593	182,191	2,754,784	932,001	929,700	1,287,116	535,667	33.8
Muskoka	490,143	44,814	534,957	58,758	60,030	382,717	93,483	11.0
Parry Sound	525,779	47,307	573,086	61,131	59,653	412,544	99,406	10.7
Nipissing	234,811	54,733	289,544	22,018	21,090	217,904	49,638	7.6
Manitoulin	189,268	22,279	211,547	38,226	37,003	104,110	69,219	18.1
*Algoma	475,741	180,604	656,345	37,599	39,203	585,844	32,902	5.7
Totals	1,915,742	349,757	2,265,499	217,732	216,985	1,703,119	344,648	9.6
The Province. { 1898	22,492,838	899,746	23,392,584	12,993,614	12,853,081	7,198,905	3,200,065	55.5
{ 1897	22,403,069	957,368	23,360,438			7,291,026	3,213,321	55.0

*Including Thunder Bay and Rainy River in this and succeeding tables.

AREA AND PRODUCE—FALL WHEAT.

TABLE IX. Showing by County Municipalities and groups of Counties the area and produce of Fall Wheat in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98; also the yield per acre.

Counties.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex.....	38,221	921,126	24.1	32,520	741,456	22.8	32,426	641,158	19.8
Kent.....	74,136	1,749,610	23.6	67,440	1,517,400	22.5	61,872	1,258,886	20.3
Elgin.....	46,043	1,077,406	23.4	42,724	1,076,645	25.2	43,458	881,863	20.3
Norfolk.....	45,112	978,930	21.7	34,604	995,933	25.8	35,032	664,172	19.0
Haldimand.....	34,034	609,209	17.9	36,624	867,989	23.7	33,627	565,437	16.8
Welland.....	19,665	414,932	21.1	18,294	354,904	19.4	21,107	345,668	16.4
Totals.....	257,211	5,751,213	22.4	236,206	5,554,377	23.5	227,522	4,357,184	19.2
Lambton.....	54,856	1,299,108	23.9	51,007	1,040,543	20.4	39,437	792,679	20.1
Huron.....	65,109	1,575,638	24.2	59,280	1,677,624	28.3	60,289	1,273,957	21.1
Bruce.....	41,691	1,071,459	25.7	36,411	921,198	25.3	40,991	821,537	20.0
Totals.....	161,156	3,946,205	24.5	146,698	3,639,365	24.8	140,717	2,888,173	20.5
Grey.....	34,266	856,650	25.0	27,697	714,583	25.8	24,726	501,064	20.3
Simcoe.....	70,670	1,872,755	26.5	64,924	1,585,685	25.2	54,232	1,199,567	22.1
Totals.....	104,936	2,729,405	26.0	90,621	2,300,268	25.4	78,958	1,700,631	21.5
Middlesex.....	79,665	1,903,994	23.9	75,943	1,928,952	25.4	72,257	1,522,996	21.1
Oxford.....	47,902	1,159,228	24.2	42,900	1,304,160	30.4	40,236	873,241	21.7
Brant.....	36,451	922,210	25.3	31,068	879,224	28.3	28,980	585,627	20.2
Perth.....	47,663	1,177,276	24.7	44,310	1,311,576	29.6	41,611	907,244	21.8
Wellington.....	23,723	616,798	26.0	17,344	475,226	27.4	20,332	433,419	21.3
Waterloo.....	42,160	1,041,352	24.7	40,285	1,059,496	26.3	38,668	834,501	21.6
Dufferin.....	10,989	241,758	22.0	9,133	209,146	22.9	8,374	169,075	20.2
Totals.....	288,553	7,062,616	24.5	260,933	7,167,780	27.5	250,458	5,926,103	21.3
Lincoln.....	19,130	376,861	19.7	19,180	483,336	25.2	20,460	379,065	18.5
Wentworth.....	30,221	631,619	20.9	27,845	814,242	29.2	29,206	572,643	19.6
Halton.....	27,525	633,075	23.0	25,916	780,072	30.1	22,289	465,467	20.9
Peel.....	29,643	664,003	22.4	31,867	879,529	27.6	25,628	556,498	21.7
York.....	39,809	1,066,881	26.8	40,631	1,121,416	27.6	34,944	792,180	22.7
Ontario.....	19,234	588,552	23.0	17,265	391,916	22.7	9,796	223,450	22.8
Durham.....	11,554	272,674	23.6	9,476	175,306	18.5	5,558	110,782	20.7
Northumberland.....	12,809	330,472	25.8	12,226	188,280	15.4	12,710	251,708	20.0
Prince Edward.....	4,376	98,460	22.5	4,600	80,960	17.6	3,385	61,435	18.1
Totals.....	194,301	4,612,597	23.7	189,046	4,915,057	26.0	163,776	3,416,223	20.9
Lennox and Addington.....	2,578	62,903	24.4	2,566	38,490	15.0	2,635	48,311	18.3
Frontenac.....	798	15,721	19.7	880	14,520	16.5	1,204	22,486	18.7
Leeds.....	2,902	67,036	23.1	1,565	18,780	12.0	3,882	72,626	18.7
Grenville.....	164	4,002	24.4	42	630	15.0			
Dundas.....	582	16,354	28.1	619	8,728	14.1	768	14,657	19.1
Stormont.....	300	7,260	24.2	294	4,969	16.9	417	7,792	18.7
Glengarry.....	75	1,688	22.5	161	1,900	11.8	348	5,833	16.8
Prescott.....	106	2,014	19.0	194	3,783	19.5	68	1,031	15.5
Russell.....	111	2,997	27.0	156	3,245	20.8	138	2,592	18.8
Carleton.....	323	9,690	30.0	90	2,025	22.5	873	14,115	16.2
Renfrew.....	317	6,340	20.0	206	3,708	18.0	630	11,564	18.4
Lanark.....	2,846	75,134	26.4	782	14,076	18.0	2,531	51,207	20.2
Totals.....	11,102	271,139	24.4	7,555	114,854	15.2	13,494	252,253	18.7
Victoria.....	8,773	228,975	26.1	1,929	36,651	19.0	6,142	126,691	20.6
Peterborough.....	11,141	296,351	26.6	4,909	85,908	17.5	8,945	180,279	20.2
Haliburton.....	278	5,477	19.7	243	3,621	14.9	143	2,387	16.7
Hastings.....	8,575	200,655	23.4	10,590	147,201	13.9	9,453	176,417	18.7
Totals.....	28,767	731,458	25.4	17,671	273,381	15.5	24,683	485,774	19.7
Muskoka.....	104	1,882	18.1	93	1,786	19.2	55	950	17.3
Parry Sound.....	86	1,539	17.9	40	780	19.5	57	925	16.2
Nipissing.....	11	220	20.0	39	390	10.0	9	144	16.0
Manitoulin.....	1,615	41,021	25.4	1,014	16,224	16.0	653	14,151	21.7
Algoma.....	340	9,418	27.7	256	3,789	14.8			
Totals.....	2,156	54,080	25.1	1,442	22,969	15.9	774	16,170	20.9
The Province.....	1,048,182	25,158,713	24.0	950,222	23,988,051	25.2	900,382	18,442,511	20.5

AREA AND PRODUCE—SPRING WHEAT.

TABLE X. Showing by County Municipalities and groups of Counties the area and produce of Spring Wheat in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98; also the yield per acre.

Counties.	1898			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Bush per acre.	Acres.	Bushels.	Bush per acre.	Acres.	Bushels.	Bush per acre.
Essex	1,138	16,842	14.8	848	13,144	15.5	1,269	18,748	14.8
Kent	2,182	36,876	16.9	1,873	25,847	13.8	2,797	43,011	15.4
Elgin	159	2,592	16.3				1,050	16,327	15.5
Norfolk	157	1,774	11.3	151	1,888	12.5	589	8,247	14.0
Haldimand	1,495	19,435	13.0	1,054	14,018	13.3	2,590	32,945	12.7
Welland	361	4,585	12.7	241	3,229	13.4	886	12,056	13.6
Totals	5,492	82,104	14.9	4,167	58,126	13.9	9,181	131,334	14.3
Lambton	923	13,937	15.1	669	9,433	14.1	4,387	63,054	14.4
Huron	3,501	58,817	16.8	4,417	65,372	14.8	11,976	169,465	14.2
Bruce	5,313	92,978	17.5	5,957	78,037	13.1	10,874	153,743	14.1
Totals	9,737	165,732	17.0	11,043	152,842	13.8	27,237	386,262	14.2
Grey	13,379	212,726	15.9	14,903	181,817	12.2	28,874	406,310	14.1
Simcoe	20,055	320,880	16.0	20,257	316,009	15.6	28,708	434,877	15.1
Totals	33,434	533,606	16.0	35,160	497,826	14.2	57,582	841,187	14.6
Middlesex	1,100	19,690	17.9	623	9,906	15.9	6,478	98,427	15.2
Oxford	785	13,424	17.1	932	16,683	17.9	5,857	94,240	16.1
Brant	702	10,039	14.3	624	11,731	18.8	975	13,517	13.9
Perth	2,572	49,382	19.2	3,539	56,270	15.9	9,015	137,036	15.2
Wellington	10,542	168,672	16.0	16,330	169,832	10.4	19,484	291,178	14.9
Waterloo	212	3,265	15.4	875	15,488	17.7	3,431	51,474	15.0
Dufferin	15,951	229,694	14.4	16,993	178,427	10.5	18,700	271,587	14.5
Totals	31,864	494,166	15.5	39,916	458,337	11.5	63,940	957,459	15.0
Lincoln	256	3,430	13.4	155	2,542	16.4	1,505	20,890	13.9
Wentworth	1,151	14,272	12.4	1,099	15,606	14.2	2,160	31,205	14.4
Halton	2,296	31,914	13.9	2,018	33,297	16.5	3,379	48,946	14.5
Peel	15,472	263,024	17.0	8,489	128,184	15.1	12,397	199,309	16.1
York	25,256	484,915	19.2	16,973	330,974	19.5	22,618	378,438	16.7
Ontario	25,085	451,580	18.0	22,133	369,621	16.7	39,263	625,238	16.2
Durham	24,072	375,523	15.6	18,434	313,378	17.0	28,830	444,209	15.4
Northumberland	26,856	394,783	14.7	18,572	315,724	17.0	23,860	316,895	13.6
Prince Edward	15,709	257,628	16.4	8,605	138,541	16.1	6,066	85,357	14.1
Totals	136,153	2,277,019	16.7	96,478	1,647,867	17.1	139,578	2,160,487	15.5
Lennox and Addington	8,674	156,999	18.1	5,608	85,802	15.3	5,306	78,339	14.8
Frontenac	9,593	148,692	15.5	7,687	112,230	14.6	7,943	119,448	15.0
Leeds	5,416	106,695	19.7	5,244	72,367	13.8			
Grenville	1,631	35,393	21.7	1,506	20,632	13.7	10,683	169,355	15.9
Dundas	2,270	45,173	19.9	2,083	29,579	14.2	3,777	69,983	18.5
Stormont	2,884	59,410	20.6	2,869	39,018	13.6	3,798	66,244	17.4
Glenagarry	5,516	97,633	17.7	5,133	78,535	15.3	6,876	111,540	16.2
Prescott	5,793	112,964	19.5	4,413	56,045	12.7	7,124	113,296	15.9
Russell	2,906	57,539	19.8	2,167	35,322	16.3	3,269	55,096	16.9
Carleton	18,532	433,649	23.4	14,899	254,773	17.1	19,660	353,737	18.0
Renfrew	32,011	688,237	21.5	26,351	397,900	15.1	24,847	416,274	16.8
Lanark	12,938	267,817	20.7	10,094	146,363	14.5	13,288	207,106	15.6
Totals	108,164	2,210,201	20.4	88,054	1,328,566	15.1	106,571	1,760,418	16.5
Victoria	23,734	412,972	17.4	18,420	283,668	15.4	27,376	402,129	14.7
Peterborough	16,815	284,174	16.9	13,708	196,024	14.3	21,903	280,446	13.2
Haliburton	1,179	14,855	12.6	870	9,222	10.6	1,277	16,315	12.8
Hastings	16,470	288,225	17.5	10,477	161,346	15.4	12,870	185,934	15.0
Totals	58,198	1,000,226	17.2	43,475	650,260	15.0	62,926	893,824	14.2
Muskoka	826	13,712	16.6	670	8,710	13.0	1,071	15,842	14.8
Parry Sound	766	13,405	17.5	434	6,250	14.4	1,053	16,321	15.5
Nipissing	670	11,055	16.5	493	8,282	16.8	216	3,623	16.8
Manitoulin	1,950	35,685	18.3	1,906	24,778	13.0			
Algoma	1,951	36,874	18.9	1,509	26,257	17.4	5,077	92,540	18.2
Totals	6,163	110,731	18.0	5,012	74,277	14.8	7,417	128,326	17.3
The Province	389,205	6,873,785	17.7	323,305	4,868,101	15.1	474,432	7,250,297	15.3

AREA AND PRODUCE—BARLEY.

TABLE XI. Showing by County Municipalities and groups of Counties the area and produce of Barley in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98, also the yield per acre.

Counties.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Bush per acre.	Acres.	Bushels.	Bush per acre.	Acres.	Bushels.	Bush per acre.
Essex	7,047	196,611	27.9	6,149	160,489	26.1	3,995	105,014	26.3
Kent	14,727	485,991	33.0	13,098	379,842	29.0	8,126	229,707	28.3
Elgin	5,752	188,666	32.8	6,630	177,684	26.8	5,376	142,610	26.5
Norfolk	2,560	62,985	24.7	2,425	56,745	23.4	4,661	114,929	24.7
Haldimand	5,122	119,855	23.4	5,436	97,848	18.0	10,415	221,414	21.3
Welland	1,562	38,425	24.6	865	17,992	20.8	2,816	64,190	22.8
Totals	36,760	1,092,533	29.7	34,603	890,600	25.7	35,389	877,864	24.8
Lambton	13,271	398,130	30.0	11,763	287,017	24.4	13,289	339,810	25.6
Huron	21,592	673,670	31.2	20,228	574,475	28.4	24,034	665,495	27.7
Bruce	12,511	399,101	31.9	10,893	299,558	27.5	15,541	410,467	26.4
Totals	47,374	1,470,901	31.0	42,884	1,161,050	27.1	52,864	1,415,772	26.8
Grey	17,935	495,006	27.6	16,578	437,659	26.4	19,056	474,451	24.9
Simcoe	25,097	697,697	27.8	28,140	764,152	26.8	30,607	815,105	26.6
Totals	43,032	1,192,703	27.7	44,718	1,191,811	26.7	49,663	1,289,556	26.0
Middlesex	16,392	485,203	29.6	16,684	492,178	29.5	15,286	411,697	26.9
Oxford	13,900	436,460	31.4	14,075	334,985	23.8	14,981	434,378	29.0
Brant	7,161	184,754	25.8	7,349	184,460	25.1	15,217	390,292	25.6
Perth	19,014	621,758	32.7	18,785	531,616	28.3	16,564	452,263	29.7
Wellington	25,347	794,361	31.3	23,785	665,980	28.0	31,305	879,121	28.1
Waterloo	14,651	460,041	31.4	14,361	409,289	28.5	16,126	476,923	29.6
Dufferin	10,354	276,452	26.7	9,503	255,631	26.9	11,280	292,648	25.9
Totals	106,819	3,258,029	30.5	104,542	2,874,139	27.5	120,759	3,377,322	28.0
Lincoln	1,942	43,112	22.2	1,276	27,944	21.9	3,219	75,891	23.6
Wentworth	5,424	148,618	27.4	5,113	137,038	26.8	10,398	273,789	26.3
Halton	4,783	130,576	27.3	5,521	146,859	26.6	10,059	269,200	26.8
Peel	16,920	482,220	28.5	21,643	605,004	28.0	30,005	802,942	26.8
York	30,160	934,960	31.0	32,350	980,215	30.3	46,769	1,325,205	28.3
Ontario	18,045	528,719	29.3	20,384	564,637	27.7	31,716	869,307	27.4
Durham	17,312	465,693	26.9	22,538	601,765	26.7	37,663	973,251	25.8
Northumberland	9,464	229,029	24.2	11,675	287,205	24.6	31,783	697,527	21.9
Prince Edward	9,591	218,675	22.8	11,439	247,082	21.6	28,883	594,845	20.6
Totals	113,641	3,181,692	28.0	131,939	3,598,729	27.3	230,515	5,881,957	25.5
Lennox and Addington	13,386	319,587	23.8	12,933	310,685	24.1	27,193	599,905	22.1
Frontenac	5,694	138,364	24.3	4,448	100,080	22.5	11,981	272,589	22.8
Leeds	5,074	134,461	26.5	4,694	111,717	23.8	9,296	226,988	24.4
Greenville	1,859	58,373	31.4	2,479	64,702	26.1			
Dundas	2,271	74,943	33.0	2,846	77,980	27.4	4,911	140,958	28.7
Stormont	2,384	69,851	29.3	2,292	59,363	25.9	2,433	64,734	26.6
Glengarry	3,677	93,436	28.6	3,348	96,757	28.9	2,383	57,432	24.1
Prescott	3,600	109,200	29.5	3,134	80,857	25.8	3,195	82,537	25.8
Russell	2,997	87,213	29.1	2,233	59,398	26.6	1,792	44,994	25.1
Carleton	6,914	224,705	32.5	7,042	191,542	27.2	7,964	228,433	28.7
Kennewick	1,038	22,006	21.2	866	17,666	20.4	1,396	30,648	23.1
Lanark	3,228	94,903	29.4	2,705	67,084	24.8	2,895	75,250	26.0
Totals	51,712	1,423,042	27.5	49,020	1,237,831	25.3	75,369	1,824,468	24.2
Victoria	15,327	421,973	27.5	13,413	443,753	24.1	25,741	647,859	25.6
Peterborough	5,197	132,004	25.4	5,701	141,693	23.1	9,651	228,050	23.6
Haliburton	262	4,297	16.4	280	5,236	18.7	248	5,572	22.5
Hastings	15,386	406,190	26.4	16,338	416,619	25.5	27,886	633,537	24.7
Totals	36,172	964,464	26.7	40,732	997,301	24.5	63,526	1,515,018	23.8
Muskoka	631	13,882	22.0	692	13,079	18.9	632	13,223	20.9
Parry Sound	941	23,149	24.6	947	19,698	20.8	738	16,700	22.6
Nipissing	311	6,687	21.5	285	7,980	28.0	108	2,532	23.4
Maitoulin	619	16,218	26.2	428	10,058	23.5	813	20,883	25.7
Algoma	772	20,458	26.5	725	19,503	26.9			
Totals	3,274	80,494	24.6	3,077	70,318	22.9	2,291	53,338	23.3
The Province	438,784	12,663,668	28.9	451,515	12,021,779	26.6	630,876	16,235,295	25.8

AREA AND PRODUCE.—OATS.

TABLE XII. Showing by County Municipalities and groups of Counties the area and produce of Oats in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98; also the yield per acre.

Counties.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Bush per acre.	Acres.	Bushels.	Bush per acre.	Acres.	Bushels.	Bush per acre.
Essex	44,864	1,606,131	35.8	47,000	1,677,900	35.7	36,577	1,338,501	36.6
Kent	46,063	1,879,370	40.8	44,826	1,685,458	37.6	37,474	1,463,027	39.0
Edgin	40,728	1,584,319	38.9	41,394	1,428,093	34.5	35,109	1,269,774	36.2
Norfolk	30,541	873,473	28.6	33,043	915,291	27.7	28,014	844,086	30.1
Haldimand	30,635	1,004,828	32.8	33,860	971,782	28.7	25,785	790,028	30.6
Welland	24,257	868,401	35.8	23,581	650,836	27.6	20,817	627,257	30.1
Totals	217,088	7,816,522	36.0	223,704	7,329,360	32.8	183,776	6,332,673	34.5
Lambton	65,666	2,596,414	39.6	68,082	2,294,363	33.7	50,260	1,866,961	36.0
Huron	124,646	4,898,588	39.3	126,134	5,032,747	39.9	93,923	3,507,432	37.3
Bruce	101,236	3,867,215	38.2	102,952	3,706,272	36.0	74,491	2,500,191	33.6
Totals	291,448	11,362,217	39.0	297,168	11,033,382	37.1	218,674	7,814,584	35.7
Grey	143,205	4,983,534	34.8	144,109	5,231,157	36.3	108,004	3,514,087	32.5
Simcoe	96,391	3,344,768	34.7	100,025	3,490,873	34.9	78,566	2,750,814	35.0
Totals	239,596	8,328,302	34.8	244,134	8,722,030	35.7	186,570	6,264,901	33.6
Middlesex	88,821	3,570,304	40.2	94,784	3,668,141	38.7	80,453	3,005,254	37.4
Oxford	69,545	2,816,573	40.5	72,809	2,839,551	39.0	59,207	2,281,433	38.5
Brant	23,063	740,322	32.1	25,580	762,284	29.8	20,117	683,343	34.0
Perth	88,538	3,957,649	44.7	87,436	3,628,594	41.5	69,201	2,830,940	40.9
Wellington	127,189	5,062,122	39.8	124,183	4,843,137	39.0	88,783	3,277,530	36.9
Waterloo	54,759	2,102,746	38.4	55,797	2,120,285	38.0	43,032	1,581,584	36.8
Dufferin	62,138	2,162,402	34.8	63,383	2,490,952	39.3	41,486	1,466,870	35.4
Totals	514,053	20,412,418	39.7	523,972	20,352,945	38.8	402,279	15,126,954	37.6
Lincoln	22,278	755,224	33.9	22,364	670,920	30.0	19,265	603,963	31.4
Wentworth	35,577	1,230,964	34.6	36,164	1,247,658	34.5	30,588	1,058,394	34.6
Halton	25,797	884,837	34.3	25,961	898,251	34.6	21,670	754,433	34.8
Peel	44,636	1,651,532	37.0	47,563	1,845,444	38.8	35,791	1,312,639	36.7
York	84,425	3,410,770	40.4	94,595	3,916,233	41.4	74,623	2,920,524	39.1
Ontario	68,844	2,595,419	37.7	71,752	2,661,999	37.1	57,922	2,147,608	37.1
Durham	43,633	1,514,065	34.7	46,551	1,675,836	36.0	39,062	1,364,048	34.9
Northumberland	45,001	1,413,031	31.4	46,023	1,495,748	32.5	35,155	1,047,520	29.8
Prince Edward	18,116	512,683	28.5	20,752	616,334	29.7	15,154	423,791	28.0
Totals	388,307	13,968,525	36.0	411,725	15,028,423	36.5	329,230	11,632,920	35.3
Lennox & Add	33,966	1,029,170	30.3	34,136	1,024,080	30.0	25,643	723,763	28.2
Frontenac	42,851	1,281,245	29.9	43,620	1,203,912	27.6	32,164	911,448	28.3
Leeds	50,222	1,672,393	33.3	48,438	1,550,016	32.0	71,495	2,236,029	31.3
Grenville	34,831	1,245,950	35.8	35,355	1,177,322	33.3			
Dundas	38,188	1,432,050	37.5	36,929	1,347,909	36.5	31,504	1,108,978	35.2
Stormont	29,480	1,161,512	39.4	28,038	939,273	33.5	25,118	854,229	34.0
Glengarry	38,175	1,385,753	36.3	37,696	1,372,134	36.4	32,262	1,038,437	32.2
Prescott	36,605	1,354,385	37.0	37,134	1,340,537	36.1	29,522	929,251	31.5
Russell	23,191	874,301	37.7	22,183	754,222	34.0	19,640	641,439	32.7
Carleton	78,907	3,164,171	40.1	79,460	2,717,532	34.2	65,919	2,326,826	35.3
Renfrew	55,459	1,935,519	34.9	56,901	1,803,762	31.7	45,278	1,447,664	32.0
Lanark	48,900	1,765,290	36.1	47,782	1,543,359	32.3	41,195	1,331,037	32.3
Totals	510,775	18,302,739	35.8	507,672	16,774,058	33.0	419,740	13,549,101	32.3
Victoria	60,534	2,124,743	35.1	66,043	2,265,275	34.3	48,677	1,624,044	33.4
Peterborough	44,277	1,337,165	30.2	47,055	1,430,472	30.4	35,935	1,101,025	30.6
Haliburton	7,393	169,300	22.9	7,433	164,336	22.1	5,521	143,447	26.0
Hastings	59,446	1,795,269	30.2	60,404	1,963,130	32.5	47,437	1,392,577	29.4
Totals	171,650	5,426,477	31.6	180,938	5,823,213	32.2	137,570	4,261,093	31.0
Muskoka	12,181	292,344	24.0	12,467	331,622	26.6	10,008	284,760	28.5
Parry Sound	14,302	376,143	26.3	13,479	411,110	30.5	7,966	231,288	29.0
Nipissing	3,916	148,808	38.0	4,073	110,786	27.2	1,556	49,520	31.8
Manitoulin	4,564	152,438	33.4	5,396	141,915	26.3	7,348	244,859	33.8
Algoma	8,480	271,360	32.0	7,763	259,284	33.4			
Totals	43,443	1,241,093	28.6	43,178	1,254,717	29.1	26,878	810,427	30.2
The Province	2,376,360	86,858,293	36.6	2,432,491	86,318,128	35.5	1,904,717	65,792,653	34.5

AREA AND PRODUCE.—RYE.

TABLE XIII. Showing by County Municipalities and groups of Counties the area and produce of Rye in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98; also the yield per acre.

Counties.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Bush per acre.	Acres.	Bushels.	Bush per acre.	Acres.	Bushels.	Bush per acre.
Essex	749	17,302	23.1	1,725	35,363	20.5	1,079	20,896	19.4
Kent	882	16,317	18.5	2,130	40,044	18.8	1,085	21,153	19.5
Elgin	1,867	34,540	18.5	3,578	67,266	18.8	1,914	32,938	17.2
Norfolk	8,201	102,513	12.5	12,368	191,704	15.5	7,985	107,963	13.5
Haldimand	1,971	30,154	15.3	2,201	42,039	19.1	965	15,222	15.8
Welland	3,033	43,979	14.5	3,888	69,695	17.9	1,138	18,245	16.0
Totals	16,703	244,807	14.7	25,890	446,011	17.2	14,166	216,437	15.3
Lambton	722	13,790	19.1	1,245	24,776	19.9	450	8,206	18.2
Huron	1,485	26,433	17.8	2,235	50,064	22.4	600	11,179	18.6
Bruce	2,933	56,020	19.1	3,202	64,040	20.0	846	15,266	18.0
Totals	5,140	96,243	18.7	6,682	138,880	20.8	1,896	34,651	18.3
Grey	3,475	59,423	17.1	3,172	65,978	20.8	984	17,371	17.7
Simcoe	6,524	103,732	15.9	8,449	142,788	16.9	3,107	53,272	17.1
Totals	9,999	163,155	16.3	11,621	208,766	18.0	4,091	70,643	17.3
Middlesex	1,404	29,484	21.0	2,584	52,197	20.2	1,022	18,798	18.3
Oxford	1,728	33,523	19.4	3,274	66,135	20.2	1,633	27,131	16.6
Brant	3,465	51,282	14.8	5,521	108,212	19.6	1,917	39,641	16.0
P-rth	567	11,310	20.0	924	19,312	20.9	353	6,832	19.4
Wellington	3,013	57,850	19.2	5,500	115,500	21.0	1,607	29,208	18.2
Waterloo	2,515	47,031	18.7	3,900	82,680	21.2	1,132	21,000	18.6
Dufferin	4,813	93,854	19.5	4,976	104,994	21.1	1,541	28,678	18.6
Totals	17,505	324,364	18.5	26,679	549,030	20.6	9,205	162,198	17.6
Lincoln	1,912	26,758	14.0	2,346	48,093	20.5	743	12,173	16.4
Wentworth	2,648	42,633	16.1	3,862	91,529	23.7	1,432	25,423	17.8
Halton	1,840	25,760	14.0	2,384	47,680	20.0	813	13,493	16.6
Peel	5,332	108,240	20.3	6,690	147,849	22.1	1,790	34,531	19.3
York	6,673	109,437	16.4	4,678	96,467	20.6	2,006	34,305	17.1
Ontario	9,424	158,323	16.8	10,654	193,904	18.2	3,842	66,301	17.3
Durham	11,990	178,651	14.9	10,813	179,496	16.6	5,684	85,415	15.0
Northumberland	13,646	188,315	13.8	14,193	201,541	14.2	11,369	152,607	13.4
Prince Edward	8,452	114,947	13.6	6,799	113,543	16.7	7,690	108,468	14.1
Totals	61,917	953,074	15.4	62,419	1,120,001	17.9	35,369	532,716	15.1
Lennox and Addington	4,481	74,385	16.6	3,733	63,461	17.0	4,005	59,837	14.9
Frontenac	3,997	55,159	13.8	3,357	47,069	14.2	3,232	50,763	15.7
Leeds	3,022	51,374	17.0	3,800	65,740	17.3	5,043	86,283	17.1
Greenville	2,679	47,150	17.6	3,721	55,443	14.9			
Dundas	2,461	47,743	19.4	2,565	51,300	20.0	1,292	28,047	21.7
Stormont	924	18,480	20.0	1,151	26,358	22.9	467	9,265	19.8
Glengarry	48	720	15.0	12	240	20.0	53	875	16.5
Prescott	137	2,192	16.0	54	713	13.2	178	3,159	17.7
Russell	28	392	14.0	61	1,342	22.0	234	4,515	19.3
Carleton	2,329	41,689	17.9	2,070	34,983	16.9	4,251	76,179	17.9
Renfrew	6,782	118,007	17.4	6,826	105,003	15.5	6,398	117,155	18.3
Lanark	2,433	44,524	18.3	2,604	42,966	16.5	3,353	61,679	18.4
Totals	29,321	501,815	17.1	29,954	496,018	16.6	28,506	497,757	17.5
Victoria	4,422	68,099	15.4	4,998	93,463	18.7	1,660	27,339	16.5
Peterborough	6,199	97,944	15.8	6,362	107,518	16.9	3,862	59,126	15.3
Haliburton	488	7,466	15.3	465	7,580	16.3	271	4,512	16.6
Hastings	12,028	190,042	15.8	11,521	193,552	16.8	11,234	173,431	15.4
Totals	23,137	363,551	15.7	23,346	402,113	17.2	17,027	264,408	15.5
Muskoka	269	4,196	15.6	308	5,298	17.2	309	5,581	18.1
Parry Sound	393	6,406	16.3	218	3,619	16.6	286	5,694	19.9
Nipissing	43	80	20.0	21	399	19.0	37	641	17.3
Manitowlin	475	10,303	21.3	411	7,480	18.2	282	5,287	18.7
Algoma	187	4,170	22.3	236	4,390	18.6			
Totals	1,367	26,225	19.2	1,194	21,186	17.7	914	17,203	18.8
The Province	165,089	2,673,234	16.2	187,785	3,382,005	18.0	111,174	1,796,013	16.2

AREA AND PRODUCE—PEAS.

TABLE XIV. Showing by County Municipalities and groups of Counties the area and produce of Peas in Ontario in the years 1897 and 1898 with the yearly average for the seventeen years 1882-88; also the yield per acre.

Counties.	1898.			1897.			Yearly average for the seventeen years, 1882-98.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	2,091	40,147	19.2	1,904	37,318	19.6	3,185	60,152	18.9
Kent	4,211	73,693	17.5	5,136	89,880	17.5	7,450	139,546	18.7
Elgin	10,236	163,776	16.0	10,250	137,350	13.4	11,938	208,718	17.5
Norfolk	16,620	176,172	10.6	16,995	190,344	11.2	16,280	277,642	17.1
Haldimand	20,742	302,833	14.6	19,386	209,369	10.8	15,432	248,808	16.1
Welland	7,037	109,777	15.6	7,269	69,782	9.6	4,953	78,287	15.8
Totals	60,937	866,398	14.2	60,940	734,043	12.0	59,238	1,013,153	17.1
Lambton	9,642	178,377	18.5	11,312	140,269	12.4	9,303	164,547	17.7
Huron	50,979	800,370	15.7	52,517	835,020	15.9	38,640	822,302	21.3
Bruce	59,231	1,172,774	19.8	59,697	1,014,849	17.0	43,867	969,414	22.1
Totals	119,852	2,151,521	18.0	123,526	1,990,138	16.1	91,810	1,956,263	21.3
Grey	63,864	1,079,302	16.9	65,835	967,775	14.7	50,424	1,027,883	20.4
Simcoe	59,990	875,854	14.6	61,263	918,945	15.0	41,649	869,194	20.9
Totals	123,854	1,955,156	15.8	127,098	1,886,720	14.8	92,073	1,897,077	20.6
Middlesex	19,588	321,037	16.9	22,110	371,448	16.8	20,640	387,569	18.8
Oxford	17,967	309,032	17.2	18,868	316,982	16.8	16,587	332,424	20.0
Brant	13,058	168,448	12.9	14,137	159,748	11.3	10,967	193,134	17.6
Perth	32,255	590,267	18.3	33,230	501,773	15.1	25,945	559,555	21.6
Wellington	39,855	629,709	15.8	40,548	543,343	13.4	37,924	794,984	21.0
Waterloo	20,686	310,290	15.0	20,773	332,368	16.0	16,819	352,840	21.0
Dufferin	21,229	231,396	10.9	22,480	254,024	11.3	15,168	289,394	19.1
Totals	164,638	2,560,179	15.6	172,146	2,479,686	14.4	144,050	2,909,900	20.2
Lincoln	7,890	115,194	14.6	8,062	112,062	13.9	5,755	96,402	16.8
Wentworth	15,260	213,640	14.0	15,156	221,278	14.6	12,214	224,916	18.4
Halton	16,642	251,294	15.1	16,002	307,238	19.2	11,803	234,069	19.8
Peel	23,815	340,555	14.3	24,063	440,353	18.3	17,323	335,607	19.4
York	40,483	635,583	15.7	44,058	801,856	18.2	33,576	698,082	20.8
Ontario	31,775	482,980	15.2	32,324	478,395	14.8	29,437	575,404	19.5
Durham	29,988	497,800	16.6	32,558	494,882	15.2	26,740	510,907	19.1
Northumberland	34,583	439,204	12.7	35,660	563,428	15.8	25,808	441,362	17.1
Prince Edward	19,734	280,223	14.2	25,286	343,890	13.6	17,744	308,227	17.4
Totals	220,170	3,256,473	14.8	233,169	3,763,382	16.1	180,400	3,424,976	19.0
Lennox and Addington	13,142	185,302	14.1	12,965	200,958	15.5	10,053	175,090	17.4
Frontenac	9,138	102,346	11.2	10,528	169,501	16.1	10,556	182,342	17.3
Leeds	4,223	69,680	16.5	4,547	85,029	18.7	5,905	110,604	18.7
Grenville	1,110	22,533	20.3	1,466	29,320	20.0	1,498	32,047	21.4
Dundas	1,491	35,337	23.7	1,579	30,317	19.2	2,112	41,116	19.5
Stormont	1,330	25,669	19.3	1,284	21,186	16.5	4,674	80,922	17.3
Glengarry	4,111	65,776	16.0	3,192	67,032	21.0	6,313	103,899	16.5
Prescott	3,814	73,992	19.4	3,404	53,783	15.8	3,019	57,178	18.9
Russell	2,189	45,969	21.0	2,275	45,500	20.0	11,339	239,202	21.1
Carleton	7,223	170,463	23.6	8,229	164,580	20.0	22,035	436,212	19.8
Renfrew	26,147	481,105	18.4	24,915	418,572	16.8	11,301	230,102	20.4
Lanark	9,996	182,927	18.3	9,880	163,020	16.5	88,805	1,688,714	19.0
Totals	83,914	1,461,099	17.4	84,264	1,448,798	17.2	19,018	367,878	19.3
Victoria	23,728	339,310	14.3	24,791	404,093	16.3	17,568	328,948	18.7
Peterborough	21,425	302,093	14.1	21,526	372,552	17.4	1,937	32,865	17.0
Haliburton	2,428	26,951	11.1	2,679	35,631	13.3	20,966	361,528	17.2
Hastings	25,330	306,493	12.1	26,962	393,645	14.6	59,489	1,091,219	18.3
Totals	72,911	974,847	13.4	75,958	1,205,921	15.9	3,291	63,009	19.1
Muskoka	3,817	35,880	9.4	3,993	57,499	14.4	2,561	51,278	20.0
Parry Sound	4,645	62,243	13.4	4,250	76,500	18.0	708	13,090	18.5
Nipissing	1,698	16,980	10.0	1,988	31,868	16.0	5,831	139,701	24.0
Manitoulin	5,863	109,638	18.7	5,911	110,536	18.7	12,391	267,078	21.6
Algoma	3,652	70,849	19.4	3,492	82,062	23.5	728,256	14,248,380	19.6
Totals	19,675	295,590	15.0	19,634	358,405	18.3			
The Province	835,951	13,521,263	15.6	896,735	13,867,093	15.5			

AREA AND PRODUCE—CORN.

TABLE XV. Showing by County Municipalities and groups of Counties the area, produce and yield per acre of Corn for husking and for silo and fodder in Ontario in the years 1897 and 1898, also the total acreage for 1897 and 1898, with the yearly average for the seventeen years 1882-98.

Counties.	For husking.			For silo and fodder.			Total area.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Tons.	Tons per acre.	1898 acres	1897 acres.	1882-98 acres.
Essex.....	56,580	4,882,854	86.3	1,705	10,520	6.17	58,285	60,048	39,548
Kent.....	47,860	4,269,112	89.2	2,733	17,811	6.40	50,643	47,018	32,325
Elgin.....	25,617	2,128,773	83.1	2,329	21,683	9.31	27,946	29,063	18,816
Norfolk.....	19,811	1,190,641	60.1	3,460	36,953	10.68	23,271	24,316	16,807
Haldimand.....	3,924	237,010	60.4	1,974	13,167	6.67	5,898	7,716	3,146
Welland.....	10,018	609,094	60.8	1,809	13,477	7.45	11,827	12,718	7,846
Totals.....	163,810	13,317,484	81.3	14,060	113,611	8.08	177,870	180,879	118,488
Lambton.....	19,602	1,462,309	74.6	4,091	40,542	9.91	23,693	25,184	13,105
Huron.....	2,144	105,270	49.1	7,218	83,368	11.55	9,362	10,801	4,239
Bruce.....	1,144	51,480	45.0	5,583	63,088	11.30	6,727	8,229	2,554
Totals.....	22,890	1,619,059	70.7	16,892	186,998	11.07	39,782	44,214	19,898
Grey.....	1,356	61,020	45.0	6,305	72,318	11.47	7,661	11,194	3,062
Simcoe.....	2,493	100,468	40.3	4,890	50,025	10.23	7,383	7,559	2,834
Totals.....	3,849	161,488	42.0	11,195	122,343	10.93	15,044	18,753	5,896
Middlesex.....	20,222	1,512,606	74.8	7,319	81,021	11.07	27,541	30,241	17,122
Oxford.....	12,010	857,514	71.4	7,268	89,324	12.29	19,278	20,530	12,380
Brant.....	6,778	465,649	68.7	2,115	21,531	10.18	8,893	10,280	6,155
Perth.....	613	35,554	58.0	7,579	89,887	11.86	8,192	8,757	3,116
Wellington.....	393	19,650	50.0	5,105	63,813	12.50	5,498	6,843	2,300
Waterloo.....	1,612	85,920	53.3	3,224	32,659	10.13	4,836	5,885	2,381
Dufferin.....	104	5,200	50.0	1,095	8,037	7.34	1,199	1,449	410
Totals.....	41,732	2,982,093	71.5	33,705	386,272	11.46	75,437	83,985	43,864
Lincoln.....	8,408	554,928	66.0	1,542	16,191	10.50	9,950	11,681	7,555
Wentworth.....	4,781	311,243	65.1	4,077	43,869	10.76	8,858	9,925	6,183
Halton.....	1,175	59,690	50.8	2,477	24,200	9.77	3,652	5,291	2,299
Peel.....	829	41,450	50.0	3,683	28,875	7.84	4,512	5,201	1,821
York.....	1,811	101,416	56.0	8,093	86,838	11.73	9,904	10,868	3,915
Ontario.....	3,270	172,002	52.6	5,376	65,694	12.22	8,646	9,121	4,337
Durham.....	2,797	119,712	42.8	4,216	40,052	9.50	7,013	6,914	3,331
Northumberland.....	6,053	278,438	46.0	5,376	50,857	9.46	11,429	12,366	6,631
Prince Edward.....	9,127	386,985	42.4	3,571	27,282	7.64	12,698	13,964	8,260
Totals.....	38,251	2,025,864	53.0	38,411	383,858	9.99	76,662	85,331	44,332
Lennox and Addington.....	5,962	302,273	50.7	2,610	22,028	8.44	8,572	8,446	4,179
Frontenac.....	4,596	249,103	54.2	5,236	58,696	11.21	9,832	9,824	3,993
Leeds.....	9,553	542,610	56.8	8,062	98,921	12.27	17,615	16,785	12,889
Grenville.....	4,971	288,815	58.1	5,502	65,254	11.86	10,473	10,872	4,387
Dundas.....	5,383	345,050	64.1	5,619	78,666	14.00	11,002	11,254	3,158
Stormont.....	3,659	249,910	68.3	4,401	59,414	13.50	8,060	7,790	2,954
Glengarry.....	1,920	78,336	40.8	6,207	87,395	14.08	8,127	7,669	2,718
Prescott.....	3,762	227,977	60.6	2,691	30,947	11.50	6,453	5,461	1,309
Russell.....	1,324	81,691	61.7	2,034	26,279	12.92	3,358	2,880	4,097
Carleton.....	2,747	204,377	74.4	7,635	96,048	12.58	10,382	9,223	1,493
Renfrew.....	1,160	52,432	45.2	3,846	50,229	13.06	5,006	3,781	3,327
Lanark.....	2,854	120,724	42.3	6,489	99,347	15.31	9,343	7,957	44,504
Totals.....	47,891	2,743,298	57.3	60,332	773,224	12.82	108,223	101,942	1,117
Victoria.....	404	20,200	50.0	2,695	30,427	11.29	3,099	3,012	1,375
Peterborough.....	713	28,520	40.0	3,053	37,399	12.25	3,766	4,199	180
Haliburton.....	218	6,540	30.0	244	2,806	11.50	462	444	10,156
Hastings.....	10,136	506,800	50.0	8,285	78,459	9.47	18,421	19,692	12,828
Totals.....	11,471	562,060	49.0	14,277	149,091	10.44	25,748	27,347	312
Muskoka.....	351	11,127	31.7	343	4,459	13.00	694	640	353
Parry Sound.....	221	8,840	40.0	181	2,444	13.50	402	353	106
Nipissing.....	64	2,560	40.0	51	510	10.00	115	106	37
Manitoulin.....	165	6,600	40.0	377	4,271	11.33	542	296	161
Algoma.....	53	2,120	40.0	124	992	8.00	177	189	643
Totals.....	854	31,247	36.6	1,076	12,676	11.78	1,930	1,584	290,453
The Province.....	330,748	23,442,593	70.9	189,948	2,128,073	11.20	520,696	544,035	

AREA AND PRODUCE.—BUCKWHEAT.

TABLE XVI. Showing by County Municipalities and groups of Counties the area and produce of Buckwheat in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98; also the yield per acre.

Counties.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	687	14,839	21.6	1,232	27,720	22.5	986	20,667	20.4
Kent	1,184	21,667	18.3	1,285	23,644	18.4	1,154	21,963	19.0
Elgin	2,590	48,174	18.6	2,731	58,717	21.5	1,887	36,948	19.6
Norfolk	7,271	114,882	15.8	7,704	125,575	16.3	5,805	102,315	17.6
Haldimand	1,208	16,791	13.9	1,170	21,645	18.5	820	13,720	16.7
Welland	2,934	39,902	13.6	3,252	56,586	17.4	2,256	39,241	17.4
Totals	15,874	256,255	16.1	17,374	313,886	18.1	12,908	234,254	18.1
Lambton	1,059	21,180	20.0	1,086	25,087	23.1	710	13,202	18.6
Huron	1,609	35,076	21.8	1,400	37,240	26.6	525	10,718	20.4
Bruce	2,468	39,488	16.0	1,560	36,816	23.6	636	11,603	18.2
Totals	5,136	95,744	18.6	4,046	99,143	24.5	1,871	35,523	19.0
Grey	5,660	97,918	17.3	3,690	93,357	25.3	1,163	22,159	19.1
Simcoe	9,533	148,715	15.6	8,733	199,112	22.8	2,654	51,732	19.5
Totals	15,193	246,633	16.2	12,423	292,469	23.5	3,817	73,891	19.4
Middlesex	1,694	33,711	19.9	1,435	26,691	18.6	860	17,088	19.9
Oxford	949	21,068	22.2	1,137	23,650	20.8	812	14,968	18.4
Brant	622	10,456	16.8	896	16,038	17.9	784	13,253	16.9
Perth	461	9,922	22.0	756	14,062	18.6	214	4,407	20.6
Wellington	2,625	47,775	18.2	1,412	37,983	26.9	470	10,082	21.5
Waterloo	550	11,000	20.0	293	5,626	19.2	178	3,159	17.7
Dufferin	1,911	35,927	18.8	1,575	44,100	28.0	415	8,971	21.6
Totals	8,802	169,853	19.3	7,504	168,150	22.4	3,733	71,928	19.3
Lincoln	443	7,442	16.8	814	15,222	18.7	733	13,879	18.9
Wentworth	1,146	22,232	19.4	1,288	28,207	21.9	953	18,071	19.0
Halton	359	3,590	10.0	473	7,237	15.3	243	3,918	16.1
Peel	1,096	10,412	9.5	1,020	27,336	26.8	379	6,409	16.9
York	3,191	49,141	15.4	3,294	75,762	23.0	1,072	22,328	20.8
Ontario	5,800	96,860	16.7	6,710	148,291	22.1	3,028	61,032	20.2
Durham	6,066	79,465	13.1	7,608	178,027	23.4	5,113	101,156	19.8
Northumberland	13,746	178,698	13.0	14,086	308,483	21.9	11,147	209,547	18.8
Prince Edward	9,598	139,171	14.5	11,914	265,682	22.3	9,516	179,612	18.9
Totals	41,445	587,011	14.2	47,207	1,034,247	22.3	32,184	615,952	19.1
Lennox and Addington	5,808	101,640	17.5	6,728	148,689	22.1	4,459	91,075	20.4
Frontenac	2,594	51,361	19.8	2,758	57,366	20.8	2,050	42,827	20.9
Leeds	4,592	77,605	16.9	3,869	100,594	26.0	6,302	128,733	20.4
Grenville	4,650	60,450	13.0	4,863	130,328	26.8			
Dundas	2,644	34,108	12.9	2,558	76,228	29.8	1,834	43,024	23.5
Stormont	2,877	52,649	18.3	2,795	85,248	30.5	2,295	51,793	22.6
Glengarry	2,039	33,440	16.4	1,859	49,078	26.4	1,394	28,149	20.2
Prescott	1,670	26,052	15.6	1,655	36,079	21.8	1,663	31,989	19.2
Russell	1,045	14,735	14.1	1,228	31,560	25.7	1,061	28,546	22.2
Carleton	6,680	98,196	14.7	6,379	165,854	26.0	4,324	89,951	20.8
Renfrew	4,103	64,417	15.7	2,924	58,480	20.0	1,880	36,580	19.5
Lanark	6,273	99,741	15.9	5,268	134,861	25.6	5,282	106,485	20.2
Totals	44,975	714,394	15.9	42,884	1,074,365	25.1	32,544	674,152	20.7
Victoria	4,617	69,255	15.0	6,180	161,298	26.1	2,620	48,649	18.6
Peterborough	4,075	61,940	15.2	4,036	94,039	23.3	2,115	38,585	18.2
Haliburton	800	9,520	11.9	652	12,649	19.4	401	6,992	17.4
Hastings	7,968	139,440	17.5	8,215	169,229	20.6	5,805	113,484	19.5
Totals	17,460	280,155	16.0	19,083	437,215	22.9	10,941	207,710	19.0
Muskoka	457	6,535	14.3	429	8,194	19.1	349	7,611	21.8
Parry Sound	405	6,683	16.5	255	5,789	22.7	181	3,470	19.2
Nipissing	187	1,870	10.0	93	2,632	28.3	68	1,314	19.3
Manitoulin	288	5,760	20.0	210	4,200	20.0			
Algoma	172	2,752	16.0	161	3,896	24.2	194	4,092	21.1
Totals	1,509	23,600	15.6	1,148	24,711	21.5	792	16,487	20.8
The Province	150,394	2,373,645	15.8	151,669	3,464,186	22.8	98,790	1,923,897	19.5

AREA AND PRODUCE.—BEANS.

TABLE XVII. Showing by County Municipalities and groups of Counties the area and produce of Beans in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98; also the yield per acre.

Counties.	1898			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Bush per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	296	4,736	16.0	558	9,988	17.9	714	12,977	18.2
Kent	28,733	482,714	16.8	28,968	567,773	19.6	21,855	371,624	17.0
Elgin	3,185	62,108	19.5	4,804	93,678	19.5	2,651	49,856	18.8
Norfolk	747	12,550	16.8	1,053	16,637	15.8	699	10,383	14.9
Haldimand	174	2,662	15.3	386	5,713	14.8	236	3,642	15.4
Welland	905	12,127	13.4	1,248	17,722	14.2	967	13,180	13.6
Totals	34,040	576,897	16.9	37,017	711,511	19.2	27,122	461,662	17.0
Lambton	1,173	20,410	17.4	2,039	37,925	18.6	976	16,974	17.4
Huron	295	3,924	13.4	403	7,859	19.5	168	3,409	20.3
Bruce	160	2,400	15.0	177	4,337	24.5	132	2,401	18.2
Totals	1,628	26,734	16.4	2,619	50,121	19.1	1,276	22,784	17.9
Grey	242	4,985	20.6	316	6,636	21.0	226	4,160	18.4
Simcoe	614	11,359	18.5	692	16,054	23.2	284	5,408	19.0
Totals	856	16,344	19.1	1,008	22,690	22.5	510	9,568	18.8
Middlesex	857	15,026	18.7	1,340	25,058	18.7	838	15,341	18.3
Oxford	306	6,640	21.7	359	7,288	20.3	270	5,312	19.7
Brant	392	5,214	13.3	582	11,116	19.1	375	5,262	14.0
Perth	154	2,310	15.0	41	820	20.0	70	1,381	19.7
Wellington	77	1,155	15.0	61	933	15.3	45	771	17.1
Waterloo	28	420	15.0	53	1,219	23.0	44	784	17.8
Dufferin	217	3,472	16.0	134	3,350	25.0	50	945	18.9
Totals	2,031	34,237	16.9	2,570	49,784	19.4	1,692	29,796	17.6
Lincoln	120	1,500	12.5	104	1,706	16.4	174	2,900	16.7
Westworth	94	1,786	19.0	208	4,181	20.1	145	2,687	18.5
Halton	42	504	12.0	38	711	18.7	44	741	16.8
Peel	144	2,592	18.0	281	5,620	20.0	76	1,486	19.6
York	427	5,338	12.5	350	6,405	18.3	237	4,651	19.6
Ontario	424	8,480	20.0	313	5,791	18.5	340	5,734	16.9
Durham	244	2,269	9.3	507	10,039	19.8	440	7,336	16.7
Northumberland	358	4,332	12.1	563	11,429	20.3	831	14,222	17.1
Prince Edward	463	4,908	10.6	450	7,560	16.8	491	8,526	17.4
Totals	2,316	31,709	13.7	2,814	53,442	19.0	2,778	48,283	17.4
Lennox and Addington	394	4,846	12.3	216	4,450	20.6	230	4,465	19.4
Frontenac	360	5,760	16.0	455	9,055	19.9	278	5,853	21.1
Leeds	310	5,363	17.3	216	3,974	18.4	398	7,315	18.4
Grenville	104	1,737	16.7	148	2,644	18.0			
Dundas	197	3,605	18.3	247	4,965	20.1	237	5,041	21.3
Stormont	207	2,898	14.0	249	7,370	29.6	175	3,965	22.7
Glengarry	128	2,560	20.0	97	2,687	27.7	185	3,446	18.6
Prescott	252	4,234	16.8	357	7,426	20.8	446	9,553	21.4
Russell	199	3,443	17.3	210	4,599	21.9	209	3,972	19.0
Carleton	418	9,071	21.7	560	13,328	23.8	484	10,338	21.4
Renfrew	387	7,740	20.0	439	7,946	18.1	500	9,976	20.0
Lanark	280	4,480	16.0	230	5,543	24.1	225	4,655	20.7
Totals	3,236	55,737	17.2	3,424	74,007	21.6	3,367	68,579	20.4
Victoria	210	2,625	12.5	189	3,478	18.4	172	2,716	15.8
Peterborough	113	2,260	20.0	136	2,761	20.3	154	2,278	14.8
Halburtou	34	520	15.3	43	860	20.0	34	590	17.4
Hastings	484	7,889	16.3	585	10,004	17.1	445	7,880	17.7
Totals	841	13,294	15.8	953	17,103	17.9	805	13,464	16.7
Muskoka	103	2,060	20.0	98	882	9.0	51	829	16.3
Parry Sound	40	600	15.0	34	680	20.0	25	422	16.9
Nipissing	33	330	10.0	19	475	25.0	13	236	18.2
Manitoulin	55	1,100	20.0	13	260	20.0	27	518	19.2
Algoma	41	615	15.0	22	386	17.5			
Totals	272	4,705	17.3	186	2,682	14.4	116	2,005	17.3
The Province	45,220	759,657	16.8	50,591	981,340	19.4	37,666	656,141	17.4

AREA AND PRODUCE—POTATOES.

TABLE XVIII. Showing by County Municipalities and groups of Counties the area and produce of Potatoes in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98; also the yield per acre.

Counties.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	3,701	384,904	104	3,575	350,350	98	3,015	287,044	95
Kent	3,539	360,978	102	3,618	238,788	66	3,364	378,012	112
Elgin	2,980	324,820	109	2,974	193,310	65	2,961	302,181	102
Norfolk	3,352	284,920	85	3,610	234,650	65	3,369	327,071	97
Haldimand	1,618	111,642	69	1,533	81,249	53	1,430	137,479	96
Welland	2,474	192,972	78	2,530	91,080	36	2,492	224,067	90
Totals	17,664	1,660,236	94	17,840	1,189,427	67	16,631	1,655,854	100
Lambton	4,043	400,257	99	4,177	233,912	56	3,246	309,860	95
Huron	4,816	370,832	77	5,054	454,860	90	5,003	599,628	120
Bruce	4,415	322,295	73	4,620	452,760	98	4,624	527,777	114
Totals	13,274	1,093,384	82	13,851	1,141,532	82	12,873	1,437,265	112
Grey	6,640	531,200	80	7,341	632,713	93	6,811	826,440	121
Simcoe	8,423	884,415	105	8,470	813,120	96	7,586	956,504	126
Totals	15,063	1,415,615	94	15,811	1,495,833	95	14,397	1,782,944	124
Middlesex	5,634	625,374	111	6,425	417,625	65	5,776	624,989	108
Oxford	2,966	320,328	108	2,999	254,915	85	3,214	358,672	112
Brant	2,386	212,576	91	2,651	201,476	76	2,299	248,748	108
Perth	4,088	331,128	81	4,281	312,513	73	3,834	444,518	116
Wellington	6,787	434,368	64	6,474	517,920	80	6,107	744,373	122
Waterloo	3,250	263,250	81	3,230	281,010	87	3,012	350,857	116
Dufferin	4,444	257,752	58	4,467	495,837	111	3,619	471,605	130
Totals	29,505	2,444,776	83	30,527	2,481,296	81	27,861	3,243,762	116
Lincoln	2,275	191,100	84	2,304	163,584	71	1,981	187,676	95
Wentworth	4,102	381,486	93	4,304	314,192	73	3,814	429,450	113
Halton	1,664	114,816	69	1,707	150,216	88	1,633	174,640	107
Peel	4,743	303,552	64	4,756	437,552	92	3,433	349,789	102
York	8,699	617,629	71	9,555	745,290	78	7,928	837,898	106
Ontario	5,220	501,120	96	5,317	505,115	95	4,715	571,179	121
Durham	3,407	327,072	96	3,316	315,020	95	3,263	395,155	121
Northumberland	5,004	380,304	76	4,896	435,744	89	4,510	487,049	107
Prince Edward	2,144	141,504	66	1,911	158,613	83	2,279	208,032	91
Totals	37,258	2,958,583	79	38,016	3,225,326	85	33,586	3,640,868	108
Lennox and Addington	3,381	256,956	76	2,801	308,110	100	3,141	341,428	109
Frontenac	4,103	340,549	83	3,758	375,800	100	3,913	401,755	103
Leeds	3,536	183,872	52	3,249	425,619	131	7,151	833,198	117
Grenville	3,143	220,010	70	3,166	402,082	127			
Dundas	2,379	218,868	92	2,300	266,800	116	2,353	309,784	132
Stormont	1,839	95,628	52	1,825	180,675	99	1,959	212,539	108
Glengarry	2,680	198,320	74	2,328	286,344	123	2,376	257,835	109
Prescott	2,674	307,510	115	2,313	268,308	116	2,424	308,806	127
Russell	1,709	215,334	126	1,400	166,600	119	1,473	164,910	112
Carleton	5,893	660,016	112	5,500	676,500	123	5,963	750,468	126
Renfrew	4,336	442,272	102	4,142	497,040	120	3,990	557,312	140
Lanark	3,290	263,200	80	3,101	480,655	155	3,449	471,702	137
Totals	38,963	3,402,535	87	35,883	4,334,533	121	38,192	4,609,737	121
Victoria	3,430	246,960	72	3,223	389,983	121	3,154	390,627	124
Peterborough	3,063	229,725	75	3,167	456,048	144	2,899	342,107	118
Haliburton	676	22,308	33	689	77,168	112	688	87,920	128
Hastings	5,778	421,794	73	5,357	567,842	106	5,620	629,942	112
Totals	12,947	920,787	71	12,436	1,491,041	120	12,361	1,450,596	117
Muskoka	1,424	113,920	80	1,352	206,856	153	1,342	175,674	131
Parry Sound	1,497	115,269	77	1,381	200,245	145	1,025	148,591	145
Nipissing	732	47,580	65	625	98,750	158	309	43,541	141
Manitoulin	611	65,988	108	712	101,816	143	1,007	159,802	159
Algoma	1,008	119,952	119	849	134,142	158			
Totals	5,272	462,709	88	4,919	741,809	151	3,683	527,608	143
The Province	169,946	14,358,625	84	169,333	16,100,797	95	159,584	18,348,634	115

AREA AND PRODUCE—MANGEL-WURZELS.

TABLE XIX. Showing by County Municipalities and groups of Counties the area and produce of Mangel-Wurzels in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98; also the yield per acre.

COUNTIES.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	426	195,960	460	491	219,477	447	325	134,044	412
Kent	756	299,376	396	595	239,785	403	399	163,609	425
Elgin	1,031	511,376	496	934	423,706	459	465	215,383	463
Norfolk	731	298,979	409	599	225,823	377	305	125,344	411
Haldimand	483	196,581	407	433	99,157	229	221	71,913	325
Welland	248	97,216	392	227	64,922	286	153	60,804	397
Totals	3,675	1,599,488	435	3,279	1,277,870	390	1,868	777,097	416
Lambton	1,441	713,295	495	1,183	427,063	361	630	270,653	430
Huron	3,963	1,866,573	471	3,743	1,665,635	445	2,142	1,021,587	477
Bruce	1,548	610,872	414	1,229	596,065	485	629	272,105	433
Totals	6,952	3,220,740	463	6,155	2,688,763	437	3,401	1,564,345	460
Grey	1,425	578,550	406	942	409,770	435	519	218,349	421
Simcoe	1,121	502,208	448	828	383,364	463	661	281,499	426
Totals	2,546	1,080,758	424	1,770	793,134	448	1,180	499,848	424
Middlesex	3,131	1,624,989	519	2,966	1,245,720	420	1,790	817,525	457
Oxford	3,001	1,701,567	567	2,448	1,069,776	437	1,530	750,106	490
Brant	1,093	533,384	488	779	387,163	497	469	233,406	498
Perth	4,155	2,052,570	494	3,776	1,551,936	411	2,280	1,074,015	471
Wellington	2,707	1,123,405	415	2,376	1,149,984	484	1,363	620,878	456
Waterloo	1,350	657,450	487	1,126	481,928	428	615	271,716	442
Dufferin	266	100,282	377	219	79,278	362	148	62,607	423
Totals	15,703	7,793,647	496	13,690	5,965,785	436	8,195	3,830,253	467
Lincoln	413	150,745	365	387	157,122	406	267	105,135	394
Wentworth	1,466	757,922	517	1,166	572,506	491	608	298,679	491
Halton	1,003	488,461	487	941	494,025	525	563	258,205	459
Peel	1,139	449,905	395	1,039	537,163	517	592	245,855	415
York	3,229	1,323,890	410	2,795	1,266,135	453	1,965	863,671	440
Ontario	1,646	855,902	520	1,375	671,000	488	890	413,293	464
Durham	1,094	490,112	448	748	381,480	510	572	256,694	449
Northumberland	810	367,740	454	750	360,750	481	536	235,201	439
Prince Edward	212	67,204	317	152	57,304	377	167	52,704	316
Totals	11,012	4,951,899	450	9,353	4,497,485	481	6,160	2,729,437	443
Lennox and Addington	222	71,706	323	149	43,955	295	137	46,101	337
Frontenac	525	178,500	340	464	143,376	309	238	83,636	351
Leeds	602	264,278	439	396	161,172	407	370	151,358	409
Grenville	354	159,300	450	263	129,133	491	153	64,214	420
Dundas	322	118,174	367	283	114,049	403	85	33,528	394
Stormont	174	84,216	484	228	91,200	400	130	52,853	407
Glengarry	348	169,824	488	299	144,417	483	96	35,637	371
Prescott	137	56,033	409	149	47,233	317	164	67,471	411
Russell	285	119,415	419	204	95,064	466	668	260,642	390
Carleton	1,084	467,204	431	1,039	482,096	464	157	61,492	392
Renfrew	353	169,440	480	252	94,500	375	219	91,730	419
Lanark	547	261,466	478	405	148,635	367	2,417	948,660	392
Totals	4,953	2,119,556	428	4,131	1,694,830	410	831	376,614	453
Victoria	1,436	570,092	397	1,395	581,715	417	376	149,070	396
Peterborough	656	307,664	469	511	263,676	516	15	4,399	293
Haliburton	27	4,401	163	43	12,040	280	513	184,808	360
Hastings	715	240,240	336	597	246,561	413	434	714,891	412
Totals	2,834	1,122,397	396	2,546	1,103,992	434	53	14,756	278
Muskoka	63	16,254	258	72	23,760	330	17	5,860	345
Perry Sound	43	11,825	275	36	14,868	413	9	3,114	346
Nipissing	53	21,200	400	45	13,500	300	39	12,797	328
Manitoulin	49	9,800	200	61	18,300	300			
Algoma	40	10,000	250	37	11,100	300			
Totals	248	69,079	279	251	81,528	325	118	36,527	310
The Province	47,923	21,957,564	458	41,175	18,103,387	440	25,074	11,101,058	443

AREA AND PRODUCE—CARROTS.

TABLE XX. Showing by County Municipalities and groups of Counties the area and produce of Carrots in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years, 1882-98; also the yield per acre.

Counties.	1898.			1897.			Yearly average for the seventeen years 1892-98.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	126	41,958	333	224	64,736	289	117	34,516	295
Kent	325	92,625	285	219	71,832	328	182	57,016	313
Elgin	246	101,106	411	284	98,548	347	212	76,586	361
Norfolk	418	128,326	307	342	106,704	312	209	64,080	307
Haldimand	172	46,440	270	183	46,482	254	105	26,907	261
Welland	100	33,500	335	88	24,112	274	81	24,093	297
Totals	1,387	443,955	320	1,340	412,414	308	904	283,198	313
Lambton	314	114,610	265	398	121,390	305	262	89,045	340
Huron	365	136,145	373	381	137,541	361	456	174,052	382
Bruce	346	132,518	383	296	131,424	444	310	108,501	350
Totals	1,025	383,273	374	1,075	390,355	363	1,028	371,598	361
Grey	452	154,132	341	325	106,600	328	479	177,704	358
Simcoe	485	169,750	350	411	160,701	391	547	199,181	364
Totals	937	323,882	346	736	267,301	363	1,026	370,885	361
Middlesex	704	267,520	380	896	353,920	395	599	213,329	356
Oxford	280	106,120	379	320	108,160	338	331	132,067	399
Brant	124	36,704	296	165	56,430	342	185	74,832	404
Perth	250	102,000	408	305	117,425	385	360	138,452	385
Wellington	231	85,470	370	248	102,176	412	307	108,829	354
Waterloo	334	123,914	371	336	119,250	355	325	131,081	403
Dufferin	114	34,998	307	122	41,114	337	137	46,005	336
Totals	2,037	756,726	371	2,392	898,505	376	2,244	844,595	376
Lincoln	188	53,768	286	186	70,680	380	137	42,241	308
Wentworth	369	136,161	369	324	134,460	415	233	89,989	386
Halton	113	44,296	392	114	44,346	389	108	41,118	381
Peel	385	128,205	333	408	179,928	441	310	106,278	343
York	519	188,397	363	492	179,088	364	593	233,045	393
Ontario	166	66,068	398	126	50,274	399	366	141,464	387
Durham	237	99,066	418	227	115,089	507	389	149,700	385
Northumberland	425	153,000	360	297	114,345	385	294	100,447	342
Prince Edward	89	19,313	217	62	22,816	368	69	16,854	244
Totals	2,491	888,274	357	2,236	911,026	407	2,499	921,136	369
Lennox and Addington	103	22,763	221	94	24,534	261	70	19,342	276
Frontenac	357	89,607	251	316	78,052	247	190	51,443	271
Leeds	236	80,476	341	183	53,985	295	267	87,876	329
Grenville	294	107,898	367	238	96,390	405	147	54,831	373
Dundas	300	108,000	360	289	94,792	328	95	31,076	327
Stormont	141	56,400	400	183	64,233	351	118	40,966	347
Glengarry	232	100,456	433	259	128,723	497	86	27,180	316
Prescott	208	79,040	380	188	58,844	313	171	61,746	361
Russell	172	58,480	340	220	94,820	431	499	163,406	327
Carleton	430	150,500	350	397	151,654	382	292	143,406	314
Renfrew	207	82,800	400	153	44,676	292	179	61,196	342
Lanark	268	88,172	329	197	63,040	320	1,965	643,968	328
Totals	2,948	1,024,592	348	2,717	953,743	351	2,688	98,707	368
Victoria	144	50,976	354	190	61,750	325	388	136,463	352
Peterborough	536	189,744	354	466	216,224	464	29	7,538	260
Haliburton	46	6,900	150	23	5,934	258	253	78,581	311
Hastings	403	130,169	323	395	166,690	422	938	321,289	343
Totals	1,129	377,789	335	1,074	450,598	419	107	30,522	285
Muskoka	153	35,037	229	168	56,952	339	64	18,532	290
Parry Sound	105	28,665	273	105	32,340	308	8	2,248	281
Nipissing	25	7,500	300	20	6,000	300	66	18,836	285
Manitoulin	85	17,000	200	83	27,397	329	245	70,138	286
Algoma	96	27,168	283	79	27,087	343			
Totals	464	115,370	249	455	149,686	329			
The Province	12,418	4,313,861	347	12,025	4,433,628	369	10,849	3,826,807	353

AREA AND PRODUCE—TURNIPS.

TABLE XXI. Showing by County Municipalities and groups of Counties the area and produce of Turnips in Ontario in the years 1897 and 1898, with the year y average for the seventeen years, 1882-98 ; also the yield per acre.

Counties.	1898.			1897			Yearly average for the seventeen years 1882-98.		
	Acres.	Bushels	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	253	96,140	380	299	86,411	289	241	69,758	289
Kent	285	91,806	321	191	63,412	332	348	119,985	345
Elgin	502	204,314	407	419	172,628	412	428	164,423	384
Norfolk	1,218	428,736	352	1,460	538,740	369	1,295	494,904	382
Haldimand	277	77,283	279	285	86,640	304	152	44,485	293
Welland	219	60,006	274	246	73,062	297	201	66,375	330
Totals	2,755	958,285	348	2,900	1,020,893	352	2,665	959,930	360
Lambton	426	197,238	463	464	181,888	392	411	146,467	356
Huron	8,337	3,659,943	439	7,908	3,772,116	477	7,401	3,102,946	419
Bruce	7,972	3,866,420	485	7,724	3,846,552	498	6,687	2,885,545	432
Totals	16,735	7,723,601	462	16,096	7,800,556	485	14,499	6,134,958	423
Grey	11,414	5,181,956	454	10,724	4,922,316	459	10,080	4,265,690	423
Simcoe	8,580	3,686,620	439	8,086	3,824,678	473	4,993	2,217,054	444
Totals	19,994	8,948,576	448	18,810	8,746,994	465	15,073	6,482,744	430
Middlesex	3,065	1,434,420	468	2,941	1,299,922	442	2,100	852,679	406
Oxford	7,515	3,810,105	507	7,839	3,754,881	479	6,342	2,934,629	463
Brant	4,404	1,647,096	374	4,876	2,194,200	450	3,396	1,561,325	460
Perth	6,003	2,857,428	476	6,018	2,515,324	418	5,175	2,172,992	420
Wellington	14,785	6,771,530	458	14,460	6,564,840	454	13,662	6,094,043	446
Waterloo	5,354	2,537,796	474	5,826	2,586,744	444	5,360	2,259,305	422
Dufferin	5,111	2,233,507	437	4,919	2,233,226	454	3,151	1,385,428	440
Totals	46,237	21,291,882	460	46,879	21,149,337	451	39,186	17,260,401	440
Lincoln	483	165,186	342	449	188,580	420	303	106,812	353
Wentworth	3,359	1,276,420	380	3,427	1,679,230	490	2,911	1,351,951	464
Halton	2,424	1,027,776	424	2,548	1,195,012	469	1,998	877,596	439
Peel	2,734	850,274	311	2,492	1,186,192	476	1,740	699,640	402
York	8,012	2,932,392	366	7,473	3,497,364	468	4,757	1,973,645	415
Ontario	12,975	5,734,950	442	13,214	5,919,872	448	12,704	5,642,017	436
Durham	6,784	2,591,488	382	6,713	3,604,881	537	5,876	2,671,468	455
Northumberland	5,746	1,907,672	332	5,595	2,769,525	495	4,078	1,695,987	416
Prince Edward	205	59,450	290	167	59,285	355	141	41,731	296
Totals	42,722	16,545,608	387	42,078	20,999,941	478	34,508	14,960,847	434
Lennox and Addington	179	41,349	231	127	33,909	267	163	40,590	249
Frontenac	724	266,432	368	794	241,376	304	462	147,324	319
Leeds	814	427,350	525	804	353,760	440	474	189,927	401
Grenville	169	66,586	394	141	73,461	521	108	39,810	369
Dundas	226	86,332	382	220	85,800	390	96	29,717	310
Stormont	124	51,212	413	87	36,018	414	120	51,678	431
Glengarry	258	111,714	433	256	137,738	538	180	68,608	381
Prescott	278	100,080	360	236	89,916	381	471	210,807	448
Russell	1,123	494,190	440	710	391,920	552	1,750	679,065	388
Carleton	2,008	925,680	460	2,188	914,584	418	747	277,240	371
Renfrew	1,157	507,923	439	1,214	441,896	364	701	287,799	411
Lanark	1,440	643,680	447	1,260	551,880	438	5,272	2,022,565	384
Totals	8,500	3,722,458	438	8,037	3,352,248	417	4,097	1,625,289	397
Victoria	5,546	2,135,210	385	5,181	2,124,210	410	1,886	781,966	415
Peterborough	2,671	1,175,240	440	2,853	1,483,560	520	314	89,851	286
Haliburton	325	73,125	225	267	103,062	386	1,414	513,990	364
Hastings	2,831	1,019,160	360	2,796	1,213,464	434	7,711	3,011,236	390
Totals	11,373	4,402,735	387	11,097	4,924,296	444	912	292,518	321
Muskoka	818	267,486	327	829	271,912	328	854	279,858	328
Parry Sound	1,194	426,258	357	1,336	468,936	351	104	33,359	321
Nipissing	280	112,000	400	253	58,949	233	645	230,070	357
Manitoulin	355	133,125	375	409	159,510	390			
Algoma	638	195,868	307	612	243,576	398			
Totals	3,285	1,134,737	345	3,439	1,202,883	350	2,515	835,805	332
The Province	151,601	64,727,882	427	149,336	68,297,148	457	121,429	51,688,286	426

AREA AND PRODUCE.—HAY AND CLOVER.

TABLE XXII. Showing by County Municipalities and groups of Counties the area and produce of Hay and Clover in Ontario for the years 1897 and 1898, with the yearly average for the seventeen years, 1882-98; also the yield per acre.

Counties.	1898.			1897.			Yearly average for the seventeen years, 1882-98.		
	Acres.	Tons.	Tons per acre.	Acres.	Tons.	Tons per acre.	Acres.	Tons.	Tons per acre.
Essex	44,396	85,240	1.92	44,027	83,211	1.89	38,849	62,021	1.60
Kent	61,285	111,539	1.82	58,265	122,357	2.10	53,217	84,535	1.59
Elgin	59,789	102,837	1.72	57,935	121,084	2.09	52,176	80,674	1.55
Norfolk	39,157	65,000	1.66	36,023	64,481	1.79	39,816	54,903	1.38
Haldimand	54,313	96,134	1.77	50,672	100,331	1.98	51,686	66,879	1.31
Welland	52,629	89,996	1.71	51,286	86,160	1.68	48,675	67,018	1.38
Totals	311,569	550,746	1.77	298,208	577,624	1.94	283,819	416,030	1.47
Lambton	70,585	119,289	1.69	68,335	142,137	2.08	60,366	89,828	1.49
Huron	109,253	197,748	1.81	106,040	213,140	2.01	102,412	146,032	1.43
Bruce	96,563	168,985	1.75	92,161	176,947	1.92	91,390	117,920	1.29
Totals	276,401	486,022	1.76	266,535	532,224	2.00	254,168	353,780	1.40
Grey	118,868	204,453	1.72	109,751	197,552	1.80	120,474	153,108	1.27
Simcoe	86,955	147,824	1.70	82,181	144,639	1.76	82,093	112,154	1.37
Totals	205,823	352,277	1.71	191,932	342,191	1.78	202,567	265,257	1.31
Middlesex	94,728	186,614	1.97	92,631	197,804	2.13	91,921	145,770	1.59
Oxford	63,993	125,426	1.96	63,292	139,875	2.21	62,667	100,886	1.61
Brant	29,570	58,549	1.98	27,716	58,481	2.11	30,927	46,801	1.53
Perth	72,653	135,861	1.87	71,813	159,425	2.22	70,557	109,048	1.55
Wellington	84,198	166,514	1.98	79,865	165,321	2.07	85,754	130,374	1.52
Waterloo	39,887	76,982	1.93	39,034	77,678	1.99	41,680	63,468	1.52
Dufferin	34,916	59,357	1.70	32,344	60,807	1.88	34,811	47,451	1.36
Totals	419,845	809,303	1.93	406,695	858,891	2.11	418,317	643,798	1.54
Lincoln	39,740	73,519	1.85	37,923	72,433	1.91	40,633	56,392	1.39
Wentworth	41,985	81,451	1.94	40,094	70,966	1.77	44,114	64,497	1.46
Halton	30,978	54,831	1.77	29,248	51,184	1.75	32,974	45,712	1.39
Peel	34,119	66,591	1.97	28,994	48,130	1.66	37,610	53,978	1.44
York	68,866	135,666	1.97	63,235	104,954	1.66	74,846	106,195	1.42
Ontario	60,451	121,507	2.01	55,925	101,784	1.82	55,375	81,634	1.47
Durham	45,704	94,150	2.06	41,681	60,021	1.44	44,356	62,550	1.41
Northumberland	55,999	108,078	1.93	52,053	57,258	1.10	54,855	69,515	1.26
Prince Edward	28,981	56,803	1.96	26,073	37,024	1.42	30,811	39,812	1.29
Totals	406,853	792,596	1.95	375,216	603,754	1.61	415,574	580,085	1.40
Lennox & Add	54,422	81,633	1.50	50,517	62,136	1.23	53,237	65,188	1.22
Frontenac	65,597	114,795	1.75	63,493	98,414	1.55	64,279	81,172	1.26
Leeds	60,147	98,641	1.61	58,235	74,958	1.27	61,571	78,172	1.27
Grenville	39,578	66,943	1.70	38,571	46,285	1.20	110,571	142,085	1.29
Dundas	34,844	68,991	1.98	32,951	48,767	1.48	36,165	55,928	1.55
Stormont	31,495	53,541	1.70	31,028	41,888	1.35	33,565	48,975	1.46
Glengarry	43,990	84,021	1.91	41,862	47,304	1.13	39,552	60,077	1.52
Prescott	44,578	81,132	1.82	45,111	26,089	.80	38,769	55,551	1.43
Russell	24,617	43,080	1.75	23,466	2,527	.96	20,655	29,465	1.43
Carleton	65,336	123,485	1.89	64,032	53,787	.84	63,934	89,119	1.39
Renfrew	72,662	118,036	1.62	72,919	63,448	.87	67,026	77,036	1.15
Lanark	57,716	77,339	1.34	58,176	45,377	.78	63,258	82,737	1.31
Totals	594,982	1,011,637	1.70	580,371	639,980	1.10	591,011	787,333	1.33
Victoria	40,948	79,439	1.94	34,434	37,877	1.10	40,651	50,618	1.25
Peterborough	35,392	66,891	1.89	34,839	34,839	1.00	39,090	44,767	1.15
Haliburton	11,804	4,519	.23	11,809	13,580	1.15	10,941	11,303	1.03
Hastings	69,536	120,993	1.74	65,459	80,515	1.23	71,971	88,051	1.22
Totals	157,680	281,842	1.79	146,541	166,811	1.14	162,656	194,739	1.20
Muskoka	23,759	36,114	1.52	22,478	30,570	1.36	21,776	26,936	1.24
Parry Sound	22,571	30,922	1.37	21,466	28,827	1.11	14,898	16,923	1.14
Nipissing	8,375	11,725	1.40	7,857	6,364	.81	3,260	4,233	1.30
Manitoulin	12,508	15,385	1.23	12,535	12,034	.96	15,691	20,983	1.34
Algoma	13,137	20,494	1.56	11,654	17,248	1.48			
Totals	80,350	114,640	1.43	75,990	90,043	1.18	55,625	69,075	1.24
The Province	2,453,503	4,399,063	1.79	2,341,488	3,811,518	1.63	2,383,737	3,810,097	1.39

RATIO OF AVERAGE PRODUCTION.

TABLE XXIII. Showing by County Municipalities and groups of Counties the per cent. ratios of total yields in 1898 to average of total yields for the seventeen years, 1882-98.

Counties.	Full wheat.	Spring wheat.	Barley.	Oats.	Rye.	Peas.	Buckwheat.	Beans.	Potatoes.	Mangel wurzls.	Carrots.	Turnips.	Hay and clover.
Essex	144	90	187	120	83	67	74	36	134	146	122	138	137
Kent	139	86	212	128	77	53	99	130	95	177	162	77	132
Elgin	122	16	132	125	105	78	130	125	107	237	132	124	127
Norfolk	147	22	55	103	95	63	112	121	87	239	200	87	118
Haldimand	108	59	54	127	198	122	122	73	81	273	173	174	144
Welland	120	38	60	138	241	140	102	92	86	160	139	90	134
Group	132	63	124	123	113	86	109	125	100	206	157	100	132
Lambton	164	22	117	144	168	108	160	120	129	264	129	135	133
Huron	124	35	101	140	236	97	327	115	62	183	78	118	135
Bruce	130	60	97	155	367	121	340	100	61	236	122	134	143
Group	137	43	104	145	278	110	270	117	76	206	103	126	137
Grey	171	52	104	142	342	105	412	120	64	265	90	121	134
Simcoe	156	74	86	122	195	101	287	210	92	178	85	170	132
Group	160	63	92	133	231	103	331	171	79	216	87	138	133
Middlesex	125	20	118	119	158	83	197	98	100	199	125	168	128
Oxford	133	14	100	123	124	93	141	125	89	227	80	130	124
Brant	118	74	47	108	167	87	79	99	85	229	49	105	125
Perth	130	36	126	140	166	105	225	167	74	191	74	131	125
Wellington	142	58	9	154	198	79	474	150	58	181	79	111	128
Waterloo	125	6	96	133	224	88	348	54	75	242	95	112	121
Dufferin	143	85	94	147	327	80	400	367	55	160	76	161	125
Group	133	52	96	135	200	88	236	115	75	203	90	123	126
Lincoln	99	16	57	125	220	119	54	52	102	143	127	155	130
Wentworth	110	46	54	116	168	95	123	66	89	254	151	94	126
Halton	136	65	49	117	191	107	92	68	66	189	108	117	120
Peel	119	132	60	126	313	101	162	174	87	183	121	122	123
York	135	128	71	117	319	91	220	115	74	153	81	149	128
Ontario	241	71	61	121	239	84	159	148	88	207	47	103	149
Durham	246	85	48	111	209	97	79	31	83	191	66	97	151
Northumberland	130	125	33	135	123	100	85	50	78	156	152	112	156
Prince Edward	160	302	37	121	106	91	77	58	68	128	115	142	143
Group	135	105	54	120	179	95	95	66	81	181	96	111	137
Lennox and Addington	130	200	53	142	124	106	112	109	75	156	118	102	125
Frontenac	70	124	51	141	109	56	120	98	85	213	174	181	141
Leeds and Grenville	98	84	85	131	14	83	107	97	48	280	214	260	117
Dundas	112	65	53	129	170	110	79	72	71	184	197	217	123
Stermont	93	90	108	136	199	62	162	73	45	251	181	172	109
Glengarry	29	88	163	133	82	81	119	74	77	321	245	216	140
Prescott	192	100	129	146	69	71	81	44	100	157	291	146	146
Russell	116	104	194	136	9	80	63	87	131	177	95	234	146
Carleton	69	123	98	136	55	7	109	88	88	179	92	136	139
Renfrew	55	165	72	134	101	110	173	78	79	276	184	183	153
Lanark	147	129	126	133	72	79	94	96	56	285	144	224	93
Group	107	126	78	135	101	87	106	81	74	223	159	184	128
Victoria	181	103	65	131	249	92	142	97	63	151	52	131	157
Peterborough	164	98	58	121	166	92	161	99	67	206	139	150	149
Haliburton	229	91	77	118	165	8	136	88	25	100	92	81	128
Hastings	114	155	64	129	110	85	123	110	67	130	166	198	137
Group	151	112	64	127	137	89	135	99	63	157	118	146	145
Niaskoka	198	87	105	103	75	57	86	248	65	110	115	91	134
Parry Sound	166	8	139	163	113	121	192	142	78	202	155	152	183
Nipissing	153	305	264	301	134	130	142	140	109	681	334	336	277
Manitoulin, Algoma, etc.	356	78	176	173	279	129	208	331	116	78	234	143	171
Group	334	86	151	153	152	111	143	235	88	189	164	136	166
The Province	136	95	78	132	149	95	123	116	78	199	113	125	133

RATIOS OF AVERAGE YIELDS PER ACRE.

TABLE XXIV. Showing by County Municipalities and groups of Counties the per cent. ratios of average yields per acre in 1898 to the average yields per acre for seventeen years, 1882-98.

Counties.	Fall wheat.	Spring wheat.	Barley.	Oats.	Rye.	Peas.	Buckwheat.	Beans.	Potatoes.	Mangel Wurzels.	Carrots.	Turnips.	Hay and clover.
Essex	122	107	106	98	119	102	106	88	109	112	113	131	120
Kent	116	110	117	105	95	94	96	99	91	93	91	93	114
Elgin	115	105	124	107	108	91	95	104	107	107	114	106	111
Norfolk	114	81	100	95	93	62	90	113	88	100	100	92	120
Haldimand	107	102	110	107	97	91	83	99	72	125	103	95	135
Welland	129	93	108	119	91	99	78	99	87	99	113	83	124
Group	117	104	110	104	96	83	89	99	94	105	102	97	120
Lambton	119	105	117	110	105	105	168	100	104	115	107	130	113
Huron	115	118	113	105	96	74	107	66	64	99	98	105	127
Bruce	129	124	121	114	106	90	88	82	64	96	109	112	136
Group	120	120	116	109	102	85	98	92	73	101	104	109	126
Grey	123	113	111	107	97	83	91	112	66	96	95	107	135
Simcoe	120	106	105	99	93	70	80	97	83	105	96	99	124
Group	121	110	107	104	94	77	84	102	76	100	96	104	131
Middlesex	113	118	110	107	115	90	100	102	103	114	107	115	124
Oxford	112	106	108	105	117	86	121	110	96	116	95	110	122
Brant	125	103	101	94	93	73	99	95	84	98	73	81	131
Perth	113	126	110	109	103	85	107	76	70	105	106	113	121
Wellington	122	107	111	108	105	75	85	88	52	91	105	103	130
Waterloo	114	103	106	104	101	71	113	84	70	110	92	112	127
Dufferin	109	99	103	98	105	57	87	85	45	89	91	99	125
Group	115	103	109	106	105	77	100	96	72	106	99	105	125
Lincoln	106	96	94	108	85	87	89	75	88	93	93	97	133
Wentworth	107	86	104	100	90	76	102	103	82	105	96	82	133
Halton	110	96	102	99	84	76	62	71	64	106	103	97	127
Peel	103	106	106	101	105	74	56	92	63	95	97	77	135
York	118	115	110	103	96	75	74	64	67	93	92	88	139
Ontario	123	111	107	102	97	78	83	118	79	112	103	101	137
Durham	114	101	104	99	99	87	66	56	79	100	109	84	146
Northumberland	129	108	111	105	103	74	69	71	71	103	105	80	153
Prince Edward	124	116	111	101	96	82	77	61	73	100	89	98	152
Group	113	108	110	102	102	78	74	79	73	102	97	89	139
Lennox and Addington	133	122	108	107	111	81	86	63	70	96	80	93	123
Frontenac	105	103	107	106	88	65	95	76	81	97	93	115	139
Leeds and Grenville	124	127	114	110	101	93	73	93	51	108	108	125	129
Dundas	147	108	115	107	89	111	55	86	70	87	97	104	128
Stormont	129	118	110	116	101	99	81	62	48	123	122	133	116
Glengarry	134	109	119	113	91	92	81	108	68	120	125	100	126
Prescott	123	123	114	117	90	118	81	79	91	110	120	94	127
Russell	144	117	116	115	73	111	64	91	113	102	94	98	122
Carleton	185	130	113	114	100	112	71	101	89	111	107	119	136
Renfrew	109	128	92	109	95	93	81	100	73	122	127	118	141
Lanark	131	133	113	112	99	90	79	77	58	114	96	109	102
Group	130	124	114	111	98	92	77	84	72	109	106	114	128
Victoria	127	118	109	105	93	74	81	73	58	88	96	97	155
Peterborough	132	128	108	99	103	75	84	135	64	118	101	106	164
Haliburton	118	98	73	88	92	65	68	88	26	56	58	79	119
Hastings	125	117	116	103	103	70	90	92	65	93	104	99	143
Group	129	121	112	102	101	73	84	95	61	96	98	99	149
Muskoka	105	112	105	84	86	49	66	123	61	93	80	102	123
Parry Sound	110	113	109	91	82	67	86	89	53	80	94	109	120
Nipissing	125	98	92	120	116	54	52	55	46	116	107	125	108
Manitoulin, Algoma, etc.	119	102	103	98	119	79	88	93	72	68	86	93	104
Group	120	104	106	95	102	69	75	100	62	90	87	104	115
The Province	117	116	112	106	100	80	81	97	73	103	98	100	129

ACREAGE UNDER CROP: ALSO PASTURE AND ORCHARD.

TABLE XXV. Showing by County Municipalities and group of Counties in Ontario, the total area under crop enumerated in tables IX—XII for the years 1897 and 1898, with the yearly average for the seventeen years, 1882-94; also the area in Pasture, in Orchard and Garden, and in Vineyard.

Counties.	Acres under crop.			Pasture.		Orchard and garden.		Vineyard.
	1898.	1897.	1882-98.	1898.	1897.	1898.	1897.	1898.
Essex	202,280	200,600	162,376	40,248	38,932	10,949	10,459	828
Kent	288,952	274,662	231,648	52,488	51,378	17,335	16,143	249
Elgin	203,054	203,720	178,441	69,847	65,649	10,562	10,293	99
Norfolk	179,346	178,693	160,866	37,524	34,999	10,401	10,300	51
Haldimand	158,142	160,939	146,008	33,182	32,756	6,741	6,403	260
Welland	127,251	125,733	114,388	25,884	26,244	9,643	8,936	1,582
Totals	1,159,025	1,144,347	993,677	259,173	249,918	65,631	62,534	3,069
Lambton	247,214	246,944	196,832	85,760	84,662	11,834	11,156	258
Huron	405,312	400,541	351,808	147,031	145,248	14,218	14,446	162
Bruce	343,114	335,107	293,572	118,620	119,502	9,931	10,215	51
Totals	995,640	982,592	842,212	352,411	349,412	35,983	35,817	471
Grey	428,486	416,577	374,882	140,145	140,558	14,963	14,484	339
Simcoe	401,821	398,018	338,521	88,228	87,100	10,685	10,733	88
Totals	830,307	814,595	713,403	228,373	227,658	25,648	25,217	427
Middlesex	344,324	351,603	317,142	171,683	164,666	16,701	16,621	158
Oxford	250,115	251,782	226,047	83,187	82,176	10,518	10,519	111
Brant	131,334	132,224	127,763	25,167	25,507	6,406	6,349	97
Perth	286,555	283,971	248,295	84,002	82,998	7,748	7,549	102
Wellington	346,477	339,429	309,443	76,062	76,353	7,478	7,467	56
Waterloo	190,572	191,774	172,803	26,611	27,059	5,908	5,557	27
Dufferin	173,652	171,697	139,290	35,370	34,755	3,595	3,255	23
Totals	1,723,029	1,722,480	1,535,783	502,082	493,514	58,354	57,317	574
Lincoln	107,020	107,231	102,730	22,239	22,324	16,551	16,420	2,902
Wentworth	151,660	150,015	144,959	32,733	32,267	12,320	11,685	1,467
Halton	119,118	118,163	109,875	29,222	29,069	8,363	7,673	253
Peel	184,720	184,506	168,895	33,553	33,427	6,187	5,993	42
York	329,653	337,337	309,869	52,414	50,580	11,886	11,990	22
Ontario	267,735	266,613	253,731	55,221	53,763	8,571	8,175	86
Durham	209,098	208,084	206,677	45,711	44,798	7,459	7,081	18
Northumberland	235,876	228,955	223,097	64,574	64,194	13,268	13,726	122
Prince Edward	130,368	132,174	130,656	36,896	37,124	9,289	8,814	95
Totals	1,735,248	1,727,077	1,650,489	372,563	368,546	93,894	91,516	5,007
Lennox and Addington	149,308	141,019	140,451	58,284	53,422	4,845	4,725	27
Frontenac	156,163	152,382	142,483	70,064	65,707	4,207	4,110	28
Leeds	158,711	152,025	144,959	88,595	87,274	4,037	4,102	55
Grenville	100,839	102,831	244,726	51,598	53,681	2,962	2,831	62
Dundas	99,177	96,723	89,134	40,097	38,847	2,751	2,770	20
Stormont	82,219	80,113	75,773	42,722	39,818	2,425	2,255	18
Glengarry	108,994	104,171	93,425	52,114	52,029	2,265	2,109	49
Prescott	106,305	103,803	92,782	43,355	43,541	1,633	1,593	35
Russell	63,930	59,293	53,605	23,454	20,852	930	939	12
Carleton	206,459	201,108	191,725	79,719	79,192	3,654	3,576	35
Renfrew	210,165	201,899	176,450	77,634	78,298	2,744	2,490	42
Lanark	159,498	150,441	151,203	116,373	117,669	2,861	2,777	22
Totals	1,601,768	1,545,908	1,451,757	747,009	730,330	35,314	34,207	405
Victoria	195,948	188,398	181,524	45,885	42,792	4,085	3,831	37
Peterborough	155,326	149,468	146,147	58,427	57,767	3,904	3,848	25
Haliburton	26,202	25,943	21,999	7,627	7,018	513	475	3
Hastings	243,371	239,388	225,526	98,468	96,655	9,010	8,638	41
Totals	620,847	603,197	575,196	210,407	204,162	17,512	16,732	106
Muskoka	45,299	44,289	40,268	10,687	10,069	1,072	989	16
Parry Sound	47,390	44,331	29,858	10,940	10,857	668	621	12
Nipissing	16,449	15,917	6,442	2,979	2,426	213	177	3
Manitoulin	29,579	29,385	37,834	5,833	5,872	556	609	19
Algoma	30,691	27,584	37,834	5,586	5,481	575	545	9
Totals	169,408	161,509	114,402	36,025	34,705	3,084	2,941	59
The Province	8,835,272	8,701,705	7,876,919	2,708,043	2,658,245	335,420	326,341	10,118

RATIOS OF AREAS UNDER CROP.

TABLE XXVI. Showing by County Municipalities and groups of Counties the number of acres under the various crops in Ontario, in 1898, per 1,000 acres of cleared land.

Counties.	Fall wheat	Spring wheat.	Barley.	Oats.	Rye.	Peas.	Corn.	Buckwheat.	Beans.	Potatoes.	Mangel wurzels.	Carrots.	Turnips.	Hay and clover	Totals.	
Essex	141.3	4.2 26 0	165.9	2.8	7.7	215.5	2.5	1.1 13.7	1.6	.5	.9	164.1	1747.8			
Kent	183.3	5.4 36.4	113.9	2.2	10.4	125.2	2.9 71.1	8.8	1.9	.8	.7	151.6	714.6			
Elgin	142.4	.5 17.8	126 0	5.8	31.7	86.4	8.0 9.8	9.2	3.2	.8	1.5	184.9	628.0			
Norfolk	176.1	.6 9.9	119 2	32.0	64.9	96.8	28.4	2.9 13.1	2.9	1.6	4.8	152.8	700.0			
Haldimand	150.6	6.6 22.7	135.6	8.7	91.8	26.1	5.3	.8 7.2	2.1	.8	1.2	240.3	699.8			
Welland	107.9	2.0 8.6	133.1	16.6	38.6	64.9	16.1	5.0 13.6	1.3	.5	1.2	288.7	698.1			
Group	154.7	3.3 22.1	130.6	10.0	56.7	107.0	9.5 20.5	10.6	2.2	.8	1.7	187.4	697.1			
Lambton	141.2	2.4 34.5	170.4	1.9	25.1	61.4	2.8	3.1 10.5	3.7	.8	1.1	183.4	642.3			
Huron	106.6	5.7 35.4	204.2	2.4	83.5	15.3	2.6	.5 7.9	6.5	.6	13.7	178.9	663.8			
Bruce	81.7	10.4 24.5	198.4	5.8	116.1	13.2	4.8	.3 8.7	3.0	.7	15.6	189.3	672.6			
Group	107.0	6.5 31.5	193.6	3.4	79.6	26.4	3.4	1.1 8.8	4.6	.7	11.1	183.6	661.3			
Grey	53.9	21.1 28.2	225.4	5.5	100.5	12.1	8.9	.4 10.5	2.2	.7	18.0	187.1	674.5			
Simcoe	125.7	35.7 44.7	171.5	11.6	106.7	13.1	17.0	1.1 15.0	2.0	.9	15.3	154.7	715.0			
Group	87.6	27.9 35.9	200.1	8.4	103.5	12.6	12.7	.7 12.6	2.1	.8	16.7	171.9	693.5			
Middlesex	136.9	1.9 28.1	152.6	2.4	33.6	47.3	2.9	1.5 9.7	5.4	1.2	5.3	162.8	591.6			
Oxford	130.1	2.1 37.8	188.9	4.7	48.8	52.4	2.6	.8 8.1	8.1	.8	20.4	173.8	679.4			
Brant	206.4	4.0 40.6	130.6	19.6	74.0	50.4	3.5	2.2 13.2	6.2	.7	24.9	167.5	743.8			
Perth	115.3	6.2 46.0	214.2	1.4	78.0	19.8	1.1	.4 9.9	10.0	.6	14.5	175.8	693.2			
Wellington	50.7	22.5 54.1	271.5	6.4	85.1	11.7	5.6	.2 14.5	5.8	.5	31.6	179.5	739.7			
Waterloo	170.7	.9 59.3	221.7	10.2	83.7	19.6	2.2	.1 13.1	5.5	1.3	21.7	161.5	771.5			
Dufferin	47.0	63.2 44.3	265.6	20.6	90.7	5.1	8.2	.9 19.0	1.1	.5	21.8	149.2	742.2			
Group	115.9	12.8 42.9	206.5	7.0	66.1	30.3	3.5	.8 11.9	6.3	.8	18.6	168.7	692.1			
Lincoln	118.3	1.6 12.0	137.8	11.8	48.8	61.5	2.8	.8 14.1	2.6	1.2	2.7	245.8	661.8			
Wentworth	141.2	5.4 25.3	166.2	12.4	71.3	41.4	5.4	.4 19.2	6.9	1.7	15.7	196.2	708.7			
Halton	162.2	13.5 28.2	152.0	10.8	98.0	21.5	2.1	.2 9.8	5.9	.7	14.3	182.5	711.7			
Peel	119.6	62.5 68.3	180.1	12.1	96.1	18.2	4.4	.6 19.2	4.6	1.6	11.0	137.8	745.5			
York	92.9	59.0 70.4	197.1	15.6	94.5	24.1	7.5	1.0 20.3	7.5	1.2	18.7	160.8	769.6			
Ontario	53.7	70.1 50.4	192.4	26.3	88.8	21.2	16.2	1.2 14.6	4.6	.5	36.3	169.0	748.3			
Durham	39.7	82.6 59.4	149.7	41.1	102.9	24.1	20.8	.8 11.7	3.8	.8	23.2	156.8	717.5			
Northumberland	38.0	79.8 28.1	133.6	40.5	102.7	33.9	40.8	1.1 14.9	2.4	1.3	17.1	166.3	700.5			
Prince Edward	22.4	80.6 49.2	92.9	43.4	101.2	65.1	49.2	2.4 11.0	1.1	.5	1.1	148.7	668.8			
Group	80.9	56.7 47.3	161.6	25.8	91.6	31.9	17.3	1.0 15.5	4.6	1.0	17.8	169.3	722.3			
Lennox and Add'n.	10.0	33.8 52.2	132.5	17.5	51.3	33.4	22.7	1.5 13.2	.9	.4	.7	212.3	582.4			
Frontenac	3.1	37.9 22.5	169.4	15.8	36.1	38.9	10.2	1.4 16.2	2.1	1.4	2.9	259.3	617.2			
Leeds	10.7	19.9 18.6	184.3	11.1	15.5	64.6	16.9	1.1 13.0	2.2	.9	3.0	220.7	582.5			
Grenville	1.0	9.6 11.0	205.6	15.8	6.5	61.8	27.4	.6 18.6	2.1	1.7	1.0	232.5	595.2			
Dundas	4.0	15.6 15.6	261.7	16.9	10.2	75.4	18.1	1.3 16.3	2.2	2.1	1.5	238.8	679.7			
Stormont	2.3	21.8 18.0	222.6	7.0	10.0	60.8	21.7	1.6 13.9	1.3	1.1	.9	237.8	620.8			
Glengarry	.4	30.5 18.1	211.4	.3	22.8	45.0	11.3	.7 14.8	1.9	1.3	1.4	243.5	603.4			
Prescott	.7	35.8 22.2	226.2	.8	23.6	39.9	10.3	1.6 16.5	.8	1.3	1.7	275.5	606.9			
Russell	1.2	30.2 31.1	240.8	.3	22.7	34.9	10.8	2.1 17.7	3.0	1.8	11.7	255.6	663.9			
Carleton	1.0	59.9 22.4	255.2	7.5	23.4	33.4	21.6	1.4 19.1	3.5	1.4	6.5	211.3	667.8			
Renfrew	1.0	107.0	3.5	185.4	22.7	87.4	16.7	13.7	1.4 14.5	1.2	.7	3.9	243.6	702.7		
Lanark	9.2	41.8 10.4	157.8	7.9	32.3	30.2	20.2	.9 10.6	1.8	.9	4.6	186.3	514.9			
Group	4.3	41.8 20.0	197.5	11.3	32.5	41.8	17.4	1.3 15.1	1.9	1.1	3.3	230.0	619.3			
Victoria	32.6	68.3 57.0	225.2	16.5	88.3	11.5	17.2	.8 12.8	5.3	.5	20.6	152.3	728.9			
Peterborough	45.7	69.0 21.3	181.8	25.4	88.0	15.5	16.7	.5 12.6	2.7	2.2	11.0	145.3	637.7			
Haliburton	7.8	33.2	7.4	208.5	13.8	68.5	13.0	22.6	.9 19.1	.7	1.3	.9	232.9	738.9		
Hastings	22.3	42.9 40.1	154.7	31.3	65.9	48.0	20.7	1.3 15.0	1.9	1.0	7.4	181.0	633.5			
Group	30.9	62.5 38.8	184.2	24.8	78.2	27.6	18.7	.9 13.9	3.0	1.2	12.2	169.2	666.1			
Muskoka	1.8	14.1 10.7	207.3	4.6	65.0	11.8	7.8	1.7 24.2	1.1	2.6	13.9	404.3	770.9			
Parry Sound	1.4	12.5 15.4	234.0	6.4	76.0	6.6	6.6	.7 24.5	.7	1.7	19.5	369.2	775.2			
Nipissing	.5	30.4 14.1	177.9	2.0	77.1	5.3	8.5	1.5 33.3	2.4	1.1	12.7	380.4	747.1			
Manitowlin	42.3	51.0 16.2	119.4	12.4	153.4	14.2	7.5	1.4 16.0	1.3	2.2	9.3	327.2	773.8			
Algoma	9.0	51.9 20.5	225.5	5.0	97.1	4.7	4.6	1.1 26.8	1.1	2.6	17.0	349.4	816.3			
Group	9.9	28.3 15.0	199.5	6.3	90.4	8.9	6.9	1.3 24.2	1.1	2.1	15.1	369.0	778.0			
The Province	80.7	30.0 33.8	182.9	12.7	66.6	40.1	11.5	3.4 13.1	3.7	1.0	11.7	188.8	680.0			

APPLES.

TABLE XXVII. Showing by County Municipalities and groups of Counties in Ontario, the number of Apple Trees over and under 15 years in 1896, 1897 and 1898.

Counties.	15 years and over.			Under 15 years.		
	1898.	1897.	1896.	1898.	1897.	1896.
Essex	170,909	175,391	147,081	100,155	112,827	115,548
Kent	319,147	277,679	251,490	208,369	174,189	179,523
Elgin	189,640	187,181	184,407	105,474	98,410	96,141
Norfolk	187,752	184,039	166,014	44,715	45,067	50,232
Haldimand	155,470	142,030	134,321	31,367	30,281	36,969
Welland	198,605	195,238	194,750	31,479	32,436	36,763
Totals	1,221,523	1,161,558	1,068,063	521,559	493,210	515,176
Lambton	230,377	227,368	203,892	146,549	154,005	145,733
Huron	329,061	326,182	319,768	126,367	137,056	140,067
Bruce	221,012	218,720	205,665	97,092	101,126	109,519
Totals	780,450	772,270	729,325	370,008	392,187	395,319
Grey	285,774	271,411	266,453	216,486	221,888	235,544
Simcoe	179,574	177,108	175,763	167,903	171,758	181,530
Totals	465,348	448,519	442,216	384,389	393,146	417,074
Middlesex	306,138	317,055	314,365	146,230	148,761	145,690
Oxford	199,642	196,461	202,281	42,844	47,263	44,315
Brant	110,291	109,276	103,435	42,137	44,378	42,552
Perth	165,930	159,805	145,707	46,427	55,375	54,513
Wellington	150,006	151,626	148,919	59,211	68,156	77,774
Waterloo	108,867	110,180	117,113	38,404	37,650	38,249
Dufferin	54,500	50,831	44,172	44,333	43,564	44,930
Totals	1,085,374	1,095,234	1,075,992	419,586	445,147	448,223
Lincoln	226,493	238,980	222,913	37,577	35,239	41,149
Wentworth	182,801	165,145	166,420	47,094	47,564	58,687
Haltou	170,681	165,283	167,631	54,396	49,346	78,207
Peel	108,697	111,416	110,273	41,387	41,658	48,630
York	216,937	228,931	236,064	102,238	98,935	104,473
Ontario	173,438	158,892	157,772	115,424	122,518	111,609
Durham	148,436	135,088	152,768	118,845	100,333	91,022
Northumberland	336,096	352,650	331,907	244,190	230,601	231,642
Prince Edward	218,663	209,799	193,443	113,277	100,059	109,937
Totals	1,782,242	1,766,184	1,739,191	874,428	826,253	875,856
Lennox and Addington	79,695	76,756	84,799	83,633	78,591	71,506
Frontenac	79,079	72,365	67,354	62,930	57,519	61,156
Leeds	77,608	76,313	72,488	63,743	67,574	63,888
Grenville	53,420	58,349	59,095	34,421	29,867	30,031
Dundas	55,611	50,800	71,478	36,113	37,149	39,171
Stermont	58,164	57,462	53,220	36,665	36,124	39,573
Glengarry	42,638	40,125	35,609	34,503	36,493	36,073
Prescott	34,511	35,594	27,270	37,510	36,409	31,271
Russell	10,742	10,124	7,616	18,469	21,146	23,167
Carleton	52,176	46,998	44,928	62,672	61,387	70,411
Renfrew	18,983	16,092	15,247	46,287	43,570	42,994
Lanark	45,851	41,875	37,817	46,859	48,790	48,269
Totals	608,478	582,853	576,921	563,795	554,619	557,010
Victoria	63,118	66,011	56,561	51,128	53,028	57,144
Peterborough	56,643	58,604	65,199	53,332	56,939	54,974
Haliburton	2,727	2,283	2,265	12,831	11,542	11,269
Hastings	142,626	136,858	149,624	141,182	140,233	148,127
Totals	265,014	263,756	273,648	258,473	261,742	271,514
Muskoka	5,895	5,810	3,857	25,145	23,929	25,219
Parry Sound	2,366	2,342	1,379	11,384	12,627	13,671
Nipissing	270	296	428	2,738	2,435	3,087
Munro	2,158	1,510	1,529	15,177	15,632	13,297
Aigoma	2,206	2,067	1,356	12,238	14,091	13,112
Totals	12,895	12,025	8,549	66,582	68,714	68,386
The Province	6,221,324	6,102,399	5,913,906	3,458,820	3,435,018	3,548,058

NOTE.—Fifteen years is considered the average period for apple trees to come into full bearing.

PART II.

LIVE STOCK, THE DAIRY AND THE APIARY.

LIVE STOCK.

The following is from the May bulletin: "The majority of the reports concerning live stock are of a most satisfactory character. Horses as a rule are in fine condition, although cases of distemper occurred here and there. Cattle are also reported to be in good health, but looking thinner than the abundance of fodder would warrant. Lumpy jaw was reported in one or two places, but not to serious extent. Sheep came through the winter in capital shape, and lambs are many and strong. A few cases of hog cholera occurred in some western sections, but the disease was quickly stamped out. With this exception swine are described as being in fine condition. Hogs are now chiefly sold when weighing from 120 to 180 pounds. The supply of fodder was plentiful, and there is an abundance of straw."

August reports were to the following effect: "Pasturage was excellent during the spring and early summer, and the yield of hay was large, but the recent dry, parching weather has been severely felt, many farmers being compelled to feed hay to their stock. The condition of live stock generally is good, though they are inclined to be thin in localities where the pasture is exhausted. There is very little serious disease among cattle. The attacks of the horn fly are mentioned by only two or three correspondents, and some herds in the county of Grey are affected with inflammation of the eyes, sometimes resulting in blindness. The prospects for fall and winter are highly encouraging, as there are ample supplies to winter the stock."

The November bulletin had the following concerning pastures and live stock: "Nearly all reports agree as to the general excellence of the pasturage since the heavy fall rains, though in a few cases it is reported as scanty owing to the effects of the drouth. Live stock as a rule are in good condition and almost universally healthy, very little mention being made of even the milder forms of ailment. A few cases of hog cholera are noted as having occurred in Welland. But little stall feeding has yet been done in any section, as owing to the prevalent high prices a very large number of store cattle as well as sheep and lambs have been sold off the pasture, and the stock on hand is pretty well depleted in most neighborhoods. Consequently there will be comparatively little fattening done during the winter. The most noteworthy development in the stock-raising department is the very great increase in the number of hogs raised in nearly all parts of the Province, which are being got ready for the market in great numbers. Many farmers consider it more profitable to sell them unfattened at present low prices. The supply of fodder will be ample in all parts—especially hay and corn—while roots will be scarce in some localities. There is great difference of opinion among correspondents as to the silo, the popularity of which appears to depend largely upon the department of the stock-raising industry in connection with which it is used. In the counties where cattle are raised mainly for beef it is alleged to be losing ground, while in the dairying counties, such as Oxford, Leeds and Grenville, its use is greatly on the increase. The almost universal crop for silo purposes is corn—many varieties being mentioned, including common corn, Southern Sweet, Mammoth Dent, Mammoth Cuban, and Compton's Early—grown in drills and cut when the corn begins to glaze. In the western section the ensilage corn crop was secured in good condition, but many reports from the eastern counties note a poor crop. Many farmers grow ensilage corn to use as stover or dry feed."

HORSES. The number of horses is given in the following table by classes for 1897 and 1898, by county groups and for the Province; also the number of horses in each district for each of the five years 1894-98:

Horses.		Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
Working horses.	1898	62,704	43,706	37,853	82,535	86,334	80,198	29,082	8,092	430,504
	1897	62,511	44,601	38,849	84,230	88,989	79,869	30,171	7,701	436,921
Breeding mares.	1898	10,277	10,416	7,558	16,049	13,723	13,781	4,764	1,318	77,886
	1897	9,314	9,336	6,839	14,558	12,378	11,921	4,219	1,375	69,940
Unbroken horses.	1898	15,482	13,179	9,156	21,067	19,502	16,120	6,519	1,826	102,851
	1897	15,381	12,826	9,265	22,257	21,911	16,397	6,676	2,096	106,809
Totals	1898	88,463	67,301	54,567	119,651	119,559	110,099	40,365	11,236	611,241
	1897	87,203	66,763	54,953	121,045	123,278	108,187	41,066	11,172	613,670
	1896	86,559	66,926	55,366	125,478	128,251	109,233	41,987	10,889	624,749
	1895	88,711	70,004	56,888	131,593	133,750	113,477	43,218	10,055	647,696
	1894	93,416	72,938	59,460	135,239	139,962	118,463	45,760	9,539	674,777

There are 611,241 horses of all classes in the Province, being 2,429 less than in the preceding year. Notwithstanding this decrease in the total there has been a substantial increase in the number of breeding mares, every group excepting the Northern Districts showing a gain. The following groups have larger figures than last year for total horses on hand: Lake Erie, Lake Huron, St. Lawrence and Ottawa, and Northern Districts. The West Midland group is this year credited with the largest number of horses, the Lake Ontario district falling to second place.

CATTLE. The following table gives the number of cattle by county groups and for the Province for 1897 and 1898, together with the total number in each of the five years 1894-98:

Cattle.		Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
Working oxen.	1893	380	153	146	134	81	227	141	518	1,780
	1897	361	208	374	124	101	371	137	644	2,320
Milch cows ...	1893	102,783	83,452	67,261	176,795	148,676	287,270	81,394	17,390	965,021
	1897	98,943	82,962	66,883	173,805	146,957	272,422	81,069	17,205	940,236
Store cattle over 2 years.	1898	40,857	63,382	34,437	83,612	42,446	56,612	17,782	6,567	345,695
	1897	39,743	64,570	38,812	87,170	47,165	60,471	20,331	7,144	365,406
Young and other cattle.	1898	104,057	123,648	90,606	193,067	133,152	170,644	64,021	24,232	903,447
	1897	94,759	120,182	88,500	183,770	136,885	170,587	61,791	23,890	874,364
Totals	1898	248,077	270,635	192,450	453,608	324,355	514,773	163,338	48,707	2,215,943
	1897	233,806	267,922	194,569	444,869	325,108	503,851	163,318	48,883	2,182,326
	1896	223,265	271,510	198,969	446,468	333,239	496,718	163,737	48,052	2,181,958
	1895	214,795	271,183	202,925	445,280	326,662	482,681	162,655	43,922	2,150,103
	1894	215,611	268,713	201,329	438,413	310,767	461,882	161,014	41,572	2,099,301

From the foregoing table it will be seen that the ox has become a rare animal in most parts of the Province. Milch cows has made an increase in numbers in every district, as have also young and other cattle, but there has been a falling off in the Province

the number of store cattle over two years old. The net result is that the total number of cattle is 2,215,943, being an increase of 33,617 over last year's figures. The Georgian Bay and Lake Ontario groups and the Northern Districts fail to show an increase in the total number of cattle compared with their own figures for 1897. The West Midland group has the largest number of store cattle and young cattle, but the St. Lawrence counties have the largest number of milch cows and the greatest total number of cattle.

HOGS. The total number of swine is given in the following table by county groups and for the Province by classes, for 1897 and 1898, together with the total for the five years, 1894-98 :

Hogs.		Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
Over 1 year....	{ 1898 1897	51,452 45,227	24,510 20,737	23,045 19,912	49,441 41,990	40,396 34,455	51,755 50,149	19,370 17,796	5,079 5,213	265,048 235,479
Under 1 year...	{ 1898 1897	293,979 217,429	144,660 106,146	125,036 95,456	292,371 223,439	237,008 186,810	187,632 147,684	80,407 59,336	14,146 13,184	1,375,739 1,049,484
Totals....	{ 1898 1897 1896 1895 1894	345,431 262,656 246,189 245,169 212,536	169,170 126,883 121,612 120,977 99,443	148,081 115,368 112,105 116,711 106,648	342,312 265,429 268,993 276,075 231,534	277,404 221,265 234,467 242,425 211,781	239,387 197,833 190,521 193,505 182,598	99,777 77,132 76,091 84,211 79,368	19,225 18,397 19,653 20,059 18,225	1,640,787 1,284,963 1,269,631 1,299,072 1,142,133

The immense increase in the number of hogs under one year is a striking feature of the table, and this, with the increase in the number over one year, brings the total number of swine in the Province up to 1,640,787, which is 355,824 more than in the preceding year. The increase has been general in both classes in every group, except in the Northern Districts, where hogs over one year failed to reach their own figures for the preceding year. The Lake Erie group has assumed the lead over the West Midland district in the total number of hogs.

SHEEP. The following table gives the number of sheep by classes, in 1897 and 1898, by county groups and for the Province, together with the total number in each of the five years, 1894-98 :

Sheep.		Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
Over 1 year....	{ 1898 1897	108,288 104,084	113,372 117,902	107,385 113,759	153,232 153,985	127,744 133,766	169,821 175,807	62,833 63,971	35,197 34,411	877,872 897,685
Under 1 year...	{ 1898 1897	95,110 91,445	113,466 117,787	96,559 101,129	142,797 138,423	114,071 114,465	153,262 150,507	54,321 52,923	29,556 25,981	799,142 792,665
Totals....	{ 1898 1897 1896 1895 1894	203,398 195,529 204,639 229,264 229,052	226,838 235,689 265,887 291,444 294,759	203,944 214,888 236,293 267,614 265,689	296,029 292,408 329,125 362,122 360,188	241,815 248,231 287,716 307,836 295,900	323,083 326,314 349,474 384,223 383,740	117,154 116,899 117,049 123,892 135,772	64,753 60,392 59,165 56,340 50,705	1,677,014 1,690,350 1,849,348 2,022,735 2,015,805

Although the number of sheep under one year has increased, there has been a larger decrease in the number over one year, the net result being that the total number of sheep is 1,677,014, or 13,336 less than in the previous year. The St. Lawrence and Ottawa counties still have the largest number of sheep of both classes.

THE WOOL CLIP. The following table gives the total number of fleeces, with total and average weights, by county groups and for the Province for 1897 and 1898, together with the average of the Province for the seventeen years, 1882-98 :

Districts.	1898.			1897.			1882-98.		
	Fleeces.	Pounds.	lb per fleece.	Fleeces.	Pounds.	lb per fleece.	Fleeces.	Pounds.	lb per fleece.
Lake Erie.....	104,326	629,492	6.03	102,345	603,820	5.90	108,136	615,351	5.69
Lake Huron.....	111,759	686,475	6.14	116,959	697,122	5.96	127,938	744,016	5.81
Georgian Bay.....	107,127	638,416	5.96	113,952	664,509	5.83	120,549	680,484	5.64
West Midland.....	151,152	931,413	6.16	151,639	917,688	6.05	183,610	1,070,729	5.83
Lake Ontario.....	127,248	819,806	6.44	132,292	828,957	6.27	154,718	928,424	6.00
St. Lawrence and Ottawa	166,689	865,708	5.19	172,691	891,358	5.16	208,804	1,043,035	5.00
East Midland.....	62,172	346,831	5.58	62,821	353,283	5.62	67,291	357,467	5.31
Northern Districts.....	34,706	186,545	5.38	34,304	183,247	5.34	19,853	109,245	5.50
The Province.....	865,179	5,104,686	5.90	887,003	5,139,984	5.79	990,944	5,548,751	5.60

Although the number of fleeces in the Province has decreased, the average weight per fleece has increased to 5.90 lb., which is .11 lb. more than in the preceding year, and .30 lb. more than the average for the seventeen years, 1882-93. The heaviest fleeces are to be found in the Lake Ontario counties, where the average weight is 6.44 lb.

LIVE STOCK SOLD. In the following table the number of each class of live stock sold in 1897 and 1898 is given by county groups and for the Province :

Live stock sold.		Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
Horses	1898	6,067	6,228	4,122	8,929	8,403	7,085	2,672	893	44,404
	1897	5,673	6,258	4,540	9,130	8,448	5,970	2,630	812	43,511
Cattle.....	1898	59,336	83,377	54,092	143,462	87,281	80,574	33,436	10,927	552,485
	1897	54,256	79,947	51,969	125,837	78,174	72,611	29,719	10,494	503,007
Sheep.....	1898	80,552	94,617	77,105	123,805	106,694	121,563	38,611	21,292	664,239
	1897	87,388	113,111	90,960	129,345	115,354	132,634	44,555	19,525	732,872
Hogs	1898	301,857	175,432	144,162	377,528	302,498	181,530	93,275	16,415	1,592,697
	1897	259,248	152,335	120,345	335,236	273,509	156,780	84,450	18,064	1,399,967
Poultry	1898	551,509	297,771	216,316	582,899	638,299	550,991	182,823	52,159	3,072,767
	1897	587,890	273,479	219,461	558,315	637,258	521,455	167,468	49,895	2,965,221

There were more horses, cattle, hogs and poultry sold in the Province during the year than in the preceding twelve months, but not so many sheep changed hands. The West Midland counties head the other groups in the number of horses, cattle, sheep and hogs sold, but the Lake Ontario district disposed of the most poultry.

REMARKS OF CORRESPONDENTS.

FROM THE AUGUST RETURNS.

Gosfield N., Essex : All summer long a number of farmers have in ensilage corn to feed their stock in case pasture gives out.

Harwich, Kent : Live stock look well, but there is a disease affecting the cattle's eyes. A scum grows over the eyes and blinds them. I have five blind now.

Cayuga, Haldimand : Haldimand farmers are feeding hay to cows now, as very few sowed ensilage on account of the prospects for hay being so good.

Warwick, Lambton : We have four cheese factories in the township. One of them makes butter in the winter.

Morris, Huron : Fine prospects—good as could be desired.

Amabel, Bruce : The horn fly is very bad, and prevents cattle from feeding and gaining as they ought.

Bentinck, Grey : Dairy products were never so abundant as in the early part of the season, but the drouth is causing the supply to shrink very much.

Orillia, Simcoe : Pastures are dried up entirely; never saw them worse. Stock will have very poor pasture if rain does not come soon, but there will be plenty of feed for winter.

Westminster, Middlesex : Everything points to a small make of July and August butter and cheese.

Dereham, Oxford : I never saw flies as bad before; cause of cows failing in milk more than anything.

Ellice, Perth : Pastures are very good, and the stock in prime condition, and the prospects for winter keep were seldom better.

Dumfries N., Waterloo : Dry weather has shortened our dairy products. Butter has increased in price two or three cents per pound.

Glanford, Wentworth : There has been a large make of butter and cheese.

Darlington, Durham : Pasture is all burned up now, but owing to the abundance in early part of season stock is in good condition.

Storrington, Frontenac : There is clover enough in this locality to winter all the stock.

Augusta, Grenville : Spring pastures are drying up, but second crop clover is in grand condition.

Dalhousie, Lanark : No grass at all between hoppers and drouth. Nothing for cattle.

Lanark, Lanark : The recent rains have made an improvement. Second growth clover is good.

Laxton, Victoria : Live stock of all kinds are in first-class condition. The prospect for winter keep was never better.

Monck, Muskoka : Cattle are still in good condition and will soon get the after grass. Hay plenty and straw good. Cattle pretty well sold off.

McKellar, Parry Sound : Dairy products will be far below the quantities made last year.

FROM THE NOVEMBER RETURNS.

Hullett, Huron : Our hog industry has grown to enormous proportions in this county. They eat nearly all the barley and peas and some oats, and they make so quick a return that farmers rely greatly on them.

Greenock, Bruce : This is a great locality for raising hogs. Nearly every farmer has from 15 to 60 pigs on hand. All breeds seem to be found—Tamworths, Berkshires and Yorkshires and Chester Whites, and the crosses of these. Tamworths and Berk-hires, and Yorkshire and Chester Whites, seem to be the commonest crosses. The very fluctuating tendency of the hog market has a discouraging effect upon the business. A drop of from \$5.75 to \$3.75 per hundred lays the buyer open to suspicion of combining. When a farmer ventures to lay up a supply of hog food and puts in a number of pigs to feed on it, and finds at the end of that he is in a hole as to expenses, he is certainly likely to go slow again. A more steady market is required.

Markham, York : The hog industry has been a very material benefit, enabling farmers to realize good prices on coarse grains. I am of the opinion that the farmers of this locality waste too much straw. If the cutting-box were used to a greater extent much of the straw might be used as fodder, which now is tramped down and nearly altogether wasted except for manure.

Richmond, Lennox : Hog products have increased largely, but owing to the low prices now prevailing, and the higher prices for grain, there is a likelihood of a diminution in the supply of hogs. There is need of co-operation in this line.

Laxton, Victoria : There has been quite a boom in hog raising this last year. I think the business will pay, with fair prices for pork, as coarse grains grow well here, and there is the skim milk, as we have no cheese factories.

POULTRY. The following appeared in the November Bulletin: "The condition of poultry is generally excellent, though some instances of loss from hen cholera and unspecified diseases are noted. The weight of opinion is strongly in favor of the profitability of poultry keeping—always provided that they receive due care and attention, instead of being practically left to themselves as is often done. Many correspondents report a disposition on the part of farmers to take a more intelligent interest in poultry growing and provide suitable accommodation for fowls during the winter—neglect in which respect is largely responsible for want of success. Hens are regarded by most who express an opinion on the subject as more profitable than other kinds of poultry. The care required by young turkeys is a drawback to raising them extensively."

The following table gives the number of poultry, by classes, for the years 1897 and 1898, by county groups and for the Province; also the total number for each of the five years 1894-98:

Poultry.		Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
Turkeys	1898	144,977	121,097	82,436	195,409	154,186	234,210	73,816	18,154	1,024,285
	1897	120,897	107,447	71,701	173,541	154,377	188,903	56,405	16,957	890,228
Geese	1898	51,025	51,958	51,826	86,677	80,369	90,421	33,490	8,569	454,335
	1897	47,030	51,316	44,348	79,324	71,506	80,150	28,974	7,067	409,715
Other fowls	1898	1,184,018	831,275	607,044	1,534,498	1,432,070	1,386,287	504,920	125,541	7,605,653
	1897	1,126,855	803,117	576,119	1,444,592	1,333,403	1,258,864	478,863	113,585	7,135,398
Totals	1898	1,380,020	1,004,330	741,306	1,816,584	1,666,625	1,710,918	612,226	152,264	9,084,273
	1897	1,294,782	961,880	692,168	1,697,457	1,559,286	1,527,917	564,242	137,609	8,435,341
	1896	1,128,460	877,044	632,565	1,553,161	1,490,340	1,403,926	523,304	125,367	7,734,167
	1895	1,092,252	861,992	635,942	1,537,230	1,559,842	1,417,580	518,100	129,902	7,752,840
	1894	1,029,046	825,368	651,343	1,498,649	1,501,417	1,420,990	498,690	127,159	7,552,662

Each district shows a considerable increase in the total number of poultry on hand. There are 9,084,273 fowls of all kinds in the Province, being an increase of 648,932, divided as follows among the various classes: Turkeys, 134,057; geese, 44,620; other fowls, 470,255. The West Midland district shows up best in the total number of poultry, but the St. Lawrence and Ottawa group has the most turkeys and geese.

REMARKS OF CORRESPONDENTS.

FROM THE NOVEMBER RETURNS.

Gosfield N., Essex: There are large numbers of poultry, chickens, ducks, geese, turkeys and guinea fowls raised and sold to the hucksters from Detroit.

Camden, Kent: The poultry on the whole is in splendid condition and profitable, especially the hen.

Raleigh, Kent: Poultry in good condition and pay well when they are properly cared for. Must have warm house in winter and good feed, warm mash, meat stuff, and green food like cabbage or mangels hung up where they can peck at it. Use sulphur and tobacco plant for lice.

Malahide, Elgin: No disease has appeared where they were properly cared for. The egg supply has been abundant and prices ruled low, average 10 cents per doz. There is a full supply for the fall and winter of dressed poultry for canning, and turkeys for export, etc.

Yarmouth, Elgin: An extra quality of poultry raised this year. They pay well.

Walsingham S., Norfolk: My experience is that good fowls pay even when their food has to be bought.

Canboro, Haldimand: Poultry has been very profitable this year. There will be a fine lot of large turkeys come from this section later.

Walpole, Haldimand : Ducks and turkeys are increasing and pay as well as anything else if managed properly.

Bertie, Welland : Poultry properly handled pay best of any farm crop or stock.

Colborne, Huron : The poultry is in good condition, and if they did not pay do you think we would keep them ?

Howick, Huron : We have very little faith in them as mortgage-lifters. A few for one's own use is well enough. There is no profit in them—they consume more than they are worth.

Tuckersmith, Huron : More attention has been paid of late years to the breeding of poultry. Plymouth Rocks, Leghorns, Minorcas, and other standard breeds each have their admirers.

Braut, Bruce : Turkeys seem to be doing well, and if properly looked after a good profit can be got for raising them.

Greenock, Bruce : Ducks, geese and turkeys are a little profit ; hens for egg production are not. In most cases hens are very poorly attended to.

Bentinck, Grey : Fowls to be profitable must be well fed, well housed and well taken care of—then they will pay.

Holland, Grey : I don't see much profit in keeping fowls, but the women must have them at any cost.

Sarawak, Grey : There is money in the hen and farmers are realizing it now.

Gwillimbury W., Simcoe : As kept by farmers their destructive habits counterbalance any profits that otherwise arise from them.

Biddulph, Middlesex : Turkeys are raised in great numbers, and only they are so hard to raise to a certain age they would be favorites. I always think they pay for the trouble by the help they give to get rid of grasshoppers and like vermin.

London, Middlesex : Profit in proportion to care given by owners.

Williams E., Middlesex : Some few make poultry pay, but the great majority neglect the hens in winter.

Norwich, N., Oxford : I think turkeys should be profitable when kept on your neighbor's farm, as they generally are.

Blanshard, Perth : Farmers seem to have most success with a limited number ; the quality being better and the profits more.

Elma, Perth : A very large quantity of turkeys, geese, ducks and chickens are kept here. They are fed and shipped to Toronto and other cities, and this year they are buying them for the English market.

Hibbert, Perth : There is a disease among hens which is getting to be serious. It generally begins with lameness and scours, then they gradually droop and die. I think it is contagious.

Guelph, Wellington : Rather more interest is being taken in poultry as a profitable branch of farm stock. Better buildings and better birds and more careful and regular attention are noticeable. As a manure producer the hen, under proper conditions, is ahead of any other class of farm stock.

Minto, Wellington : Moulded early and are in fine condition. Consider we make fifty per cent. profit. The best pay.

Garafraxa E., Dufferin : This was a bad year for turkeys, which did not do well. We lost most of them when young, as there were very few grasshoppers.

Amaranth, Dufferin : The profits are not large, considering what they destroy. I've lost my carrots and mangels by them ; worth more than they will bring.

Niagara, Lincoln : Hens give good profits if the right kind is kept, such as Leghorns, and well fed. Turkeys are hard to raise and troublesome. Ducks are no good, and geese are worse.

Barton, Wentworth : All keep more or less because they have always done so, and say "They don't pay."

Saltfleet, Wentworth : Have proved to my satisfaction that with good ordinary care a farmer can make one dollar per hen clear profit over cost of feed.

Chingacousy, Peel : Spring chickens have been grown extensively and with good profits. Turkeys have not done very well ; a great many died in the spring.

Markham, York : If this wet cold weather keeps on, roup will surely take place if poultry is not properly housed.

Mara, Ontario : Farmers are erecting more suitable buildings and paying more attention to their poultry as to breeding and feeding, and the result is the poultry business is flourishing.

Cartwright, Durham : Hens, in my opinion, are the only poultry that pay.

Hamilton, Northumberland : Every farmer should keep a number of barnyard fowl to pick up the waste grain that otherwise would be lost. In this way poultry pays well.

Ameliasburg, Prince Edward : If kept well, each hen is worth from \$1 to \$2 per head clear of all expenses for laying purposes.

Leeds and Lansdowne Front, Leeds : It is the best paying investment for the outlay on the farm.

Lancaster, Glengarry : The women say that they pay, according to their trouble, better than our pet stock.

Osgoode, Carleton : I have kept an account of 100 hens, and charging them with feed, and not counting the eggs used in the family or the chickens raised, I have cleared fifty cents on each hen.

Wilberforce, Renfrew : For the last two or three years I have been experimenting in the fowl or poultry line, and they are one of the last things I would go at to make money out of.

Drummond, Lanark : Some disease attacked fowl this year which carried off a good many. They ceased eating, their combs turned purple and they died in a couple of days.

Mariposa, Victoria : Hens are the most profitable of all fowl kept by the farmer if properly attended to, and the Plymouth Rock the best paying breed.

Thurlow, Hastings : The country is full of turkeys. I never saw so many.

Tyendinaga, Hastings : The hen has won the confidence of the farmer, consequently there is a marked improvement each year in the care and attention bestowed.

Morrison, Muskoka : What makes poultry raising difficult with us is the prevalence of hawks, skunks and other vermin.

Thessalon, Algoma : Seem to pay well here as there is good demand.

Wainwright, Rainy River : Condition fine, and good market for eggs and birds.

THE APIARY.

The reports regarding bees, received in August, were to the following effect : "The season has been a good one for honey, bees swarming early and in some neighborhoods excessively. The supply of nectar was profuse, especially from clover, but basswood yielded little, and latterly there has been a scarcity by reason of the dry weather. The average yield will be nearly fifty lbs. per hive, and there has been a good increase in colonies. The bees are said to be in fine condition, and very little disease is reported."

The November bulletin said : "The yield of honey was only fair in the Western section, but decidedly better in the East, where the season was an unusually good one. The production of honey was much larger during the spring and early summer than later in the year, owing to the drouth, and many hives will need to be fed during the winter to keep them alive. Bees are in good condition, and very few cases of foul brood are reported."

The following table shows by county groups and for the Province the number of hives of bees kept in township localities during each of the seven years 1892-98, together with their value (including outfit) in each of the six years 1893-98 :

Bees.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
	No.	No.	No.	No.	No.	No.	No.	No.	No.
No. of hives .									
1898	35,476	18,590	9,093	32,239	29,041	54,782	9,124	1,735	190,080
1897	26,755	16,464	11,113	23,014	26,325	50,700	11,371	1,069	166,811
1896	23,107	14,406	9,347	20,195	29,425	48,551	13,924	1,121	160,076
1895	27,264	18,368	11,708	23,625	36,023	43,880	11,013	1,292	173,173
1894	36,019	25,159	14,644	29,146	39,544	46,231	8,094	1,257	200,094
1893	37,816	27,786	14,019	31,244	38,594	46,382	8,161	1,166	205,168
1892	36,191	28,924	12,030	28,201	38,672	43,730	7,064	1,010	195,822
	\$	\$	\$	\$	\$	\$	\$	\$	\$
Value of bees and outfit .									
1898	177,765	107,291	52,868	175,700	161,390	264,436	49,445	9,154	998,049
1897	130,369	94,161	67,966	131,136	148,273	248,739	58,579	5,973	885,196
1896	120,266	80,435	52,400	119,940	162,125	241,521	70,957	6,764	854,408
1895	148,386	104,990	60,630	140,489	198,504	217,098	60,884	7,677	938,658
1894	179,126	139,685	78,575	167,578	207,983	226,867	44,957	6,903	1,051,574
1893	201,855	186,265	72,663	209,213	222,465	220,952	42,569	6,963	1,162,945

There are 190,080 hives in the Province, or 23,269 more than were reported in the preceding year, although the Georgian Bay and East Midland groups fail to equal their

respective figures for 1897. The St. Lawrence and Ottawa counties have the most hives. The value of the bees and apiary outfit of the Province is \$998,049, compared with \$885,196 in the preceding year.

REMARKS OF CORRESPONDENTS.

FROM THE AUGUST RETURNS.

Malahide, Elgin: It is not a good bee year. Too dry for white clover.

McKillop, Huron: Bees wintered well, and did remarkably well the first part of season, but latterly there has been no feed for them on account of the extreme dry weather.

Culross, Bruce: Bees have done well. Good swarming and plenty of good honey.

Glanford, Wentworth: Swarming was the earliest in my recollection, May 16th, and continuing right on.

Trafalgar, Halton: This has been an excellent season for bees—the most successful in my own experience for seven or eight years.

Hamilton, Northumberland: Bees have done well, and honey will be plentiful and cheap.

Percy, Northumberland: There was almost too much swarming this season. Many yards trebled their number.

Sophiasburg, Prince Edward: A great crop of nice white honey.

Storrington, Frontenac: I never knew the bees to swarm as often. Supply of honey was great.

Yonge and Escott Rear, Leeds: Apiarists all say this has been a good season for bees and for making honey.

Gower N., Carleton: The best swarming I ever knew of. In most cases people have five for the one put out in spring.

Lash, Rainy River District: Bees not doing so well this year; think because it is too cool and showery.

THE DAIRY.

The August bulletin said: "The general lack of fresh pasture has resulted in a marked temporary falling off in the flow of milk, and a consequent slackening in dairy operations. Recent rains have already in some neighborhoods restored the fertility of the pastures."

November reports were more favorable, as will be seen from the following which appeared in the bulletin issued in that month: "The dairying industry has been fairly prosperous, notwithstanding the drawback of low prices for cheese, one result of which is that more attention is being paid in most localities to butter-making, which many of our correspondents regard as more profitable. Better prices were as a rule obtained for butter than last season, and there appears to be a steady improvement in quality and a tendency towards combining the two branches of dairying by carrying on butter-making during the winter in cheese factories. One reason why many farmers now accord a preference to butter is that it offers the obvious advantage, as compared with cheese manufacture, of leaving them a supply of skim-milk available for young stock. Much divergence of opinion prevails as to the best breeds of milch cows. The Durham strain is by far the most popular as an 'all round' breed, and western farmers who combine dairying with stock-raising for the market very generally give the Shorthorn the preference. In the dairying counties of the eastern section, however, where the beef-making qualities of cattle are less regarded, the Ayrshire has the first place, the Durham grades coming next in favor, while Holsteins and Jerseys are more numerous than in the west."

REMARKS OF CORRESPONDENTS.

FROM THE NOVEMBER RETURNS.

Gosfield N., Essex: Most farmers patronize the cheese factory, as they get cash for their milk and less work, whereas if they made butter they would get trade only at the village stores.

Dorchester S., Elgin: The tendency seems to be to shorten the cheese-making season.

Dorchester S., Elgin: For a dairy section we are slow to build silos. There are not a dozen in the township.

Southwold, Elgin: Shorthorn Durhams are the greatest favorites, owing to the steers being more bought for fattening.

Yarmouth, Elgin : Butter is climbing. Mostly cheese yet, but butter is going to get there.

Widham, Norfolk : Dairy business has not been very satisfactory this season on account of the low price of cheese.

Cayuga S., Haldimand : Butter paid better than cheese this summer.

Therold, Welland : Owing to the travelling dairy, much improvement has grown up in the quality and prices grew with the improvement.

Warwick, Lambton : The dairy interest has proved a failure here. The price of cheese is too low.

Ashfield, Huron : I believe more butter was made than other years.

Howick, Huron : Butter improved in quality. Cause—better and more careful feeding of milk kine.

Hullett, Huron : We have one creamery and two cheese factories, and they are not properly supported by the farmers, who do not keep enough cows, and do not feed what they have properly.

Stephen, Huron : The native cow crossed on some good milch breed, such as Ayrshire or Holstein, is considered best. Thoroughbred cows have lost favor here, as they are not hardy enough.

Turnberry, Huron : There are a good many sending to the creameries that formerly sent to cheese factories.

Derby, Grey : Cheese-making is not in favor in this locality. The farmers prefer having the skim milk for their calves.

Proton, Grey : Our farmers are raising the Shorthorn with our grades. They are considered the best for beef and make the largest for the market.

Oro, Simcoe : Dairy industry advancing in the last few years—especially butter.

Caradoc, Middlesex : The Ayrshire has given the best results as a dairy cow.

Tecumseth, Simcoe : Creameries seem to be the most profitable at present. Prices of butter better than last year and quality improving.

Essa, Simcoe : A cross between the Jersey and Durham would make a most useful and profitable experiment.

Dorchester N., Middlesex : Cheese is made from April to November, then butter all winter.

Nissouri W., Middlesex : A number of skimming apparatus and churns have been put in operation in connection with old established cheese factories for the accommodation of patrons for fall and winter.

Blandford, Oxford : Cheese is still king, but butter is making steady progress, and butter plants are being put in cheese factories for winter use hereabouts.

Oakland, Brant : Many of the largest farmers are now purchasing cream separators, and report very satisfactory results. Jerseys are losing ground and Ayrshires gaining.

Amaranth, Dufferin : Creamery at Whittington has done splendidly, about \$10,000; cheese factory at Laurel \$7,000, with September and October's product yet to sell, which should bring \$2,500 more.

Saltfleet, Wentworth : Butter has been dearer than for many years.

Saltfleet, Wentworth : Butter has been about the same price as it was last year.

Esquesing, Halton : Private dairying with all its disadvantages is still the rule.

Trafalgar, Halton : The creamery and cheese factory are growing very rapidly in favor in this county.

Markham, York : Durhams are considered the best all-round cattle for the farmer.

Scarboro', York : A Jersey cross with our common cows gives the best results for butter.

Pickering, Ontario : We have mostly Shorthorn grades, so as to get large boned calves for beef.

Darlington, Durham : During the summer months cheese takes the lead.

Hamilton, Northumberland : Jerseys and Ayrshire grades are more numerous than they used to be.

Percy, Northumberland : Every farmer is in the dairy industry, and most of them in cheese in the summer and butter in the winter.

Ameliasburg, Prince Edward : Ayrshires and Ayrshire grades are in greatest favor here as milch cows.

Storrington, Frontenac : I think of late years farmers generally are in better circumstances than formerly. The factory in which my milk is manufactured realized last season \$23,250 for the cheese produced, and there will be more this season.

Leeds and Lansdowne Front, Leeds : Dairying is carried on to a very large extent. It seems to be increasing every year and a marked improvement in butter.

Augusta, Grenville : Holstein and Ayrshire are in favor here. Holsteins are more in favor than the Ayrshires.

Williamsburg, Dundas : Butter production in this county is not a circumstance as compared to cheese.

Caledonia, Prescott : We like grade Durham and Ayrshire, or Holstein and Ayrshire, best.

Fitzroy, Carleton : There is much more milk sent to the cheese factories than to the creameries.

Gower N., Carleton : The most of farmers are aiming for a cross between Durhams and Ayrshires.

Drummond, Lanark : Ayrshire grades appear to be gaining in favor.

Drummond, Lanark: The cow, corn and cheese factory have been the means of lifting many a mortgage in this county within the last ten years, which has been due in a great measure to Farmers' Institute meetings.

Laxton, Victoria: No cheese factory in this township, so it is all butter-making yet. The price was very fair this season and I think more is being made; more cows are kept.

Otonabee, Peterborough: Shorthorns seem to be the favorites. Ayrshires are coming in.

ThurLOW, Hastings: Cheese-making is flourishing, but people begin to think it overdone, and are starting butter factories.

Monteagle, Hastings: Dairy interest is looking up here; going into creamery more than heretofore instead of cheese.

Tyendinaga, Hastings: This is specially a dairy section—cheese especially manufactured, but dairy men are turning their attention to manufacturing butter, and I think before another year some creameries will be erected.

Morrison, Muskoka: Cheese causes discontent and quarrelling to such an extent, and hinders the raising of calves so much, that the butter crop is preferred.

Watt, Muskoka: Not much improvement either in breed or care of our milk stock; the cow that will give the greatest weight of milk is the animal preferred, as the quality of product is of no account at our cheese factories.

Assiginack, Manitoulin: The dairy industry promises to be good, but we have no creamery or cheese factory—hence we are at a loss.

Tarbutt, Algoma: The farmers are going into dairying more each year.

Thessalon, Algoma: There is quite a lot of good butter made in this township; not much cheese.

CREAMERIES. The following table gives the statistics furnished by 93 public creameries for 1898-9, showing the quantity and value of butter made, the average number of patrons and the average price per pound; of the 93 creameries making returns 14 are operated in summer, 62 in winter, and 17 are going all the year, from twice a week up. It also gives an estimate for all creameries in operation for the six years, 1893-8:

Creameries.	No. of returns.	Butter made.		Average No. of patrons.	Average price of butter per pound.	Milk required to make 1 lb. of butter.	Amount paid to the patrons for milk or cream.
		Quantity.	Value.				
		lb.	\$		cts.	lb.	%
Summer.....	14	804,681	136,416	2,443	16.95	24.68	111,293
Winter.....	62	1,027,886	193,132	3,118	18.79	23.22	157,577
All the year.....	17	1,649,632	301,351	3,229	18.27	24.60	231,378
Total estimated for all creameries in operation—							
1898.....	282	9,008,992	1,632,234	22,741	18.12	23.99	1,294,220
1897.....	214	7,708,265	1,403,609	18,909	18.21	23.97	1,139,463
1896.....	170	6,033,241	1,101,232	12,245	18.25	24.13	.....
1895.....	135	4,553,708	863,382	9,664	19.07	24.75	.....
1894.....	115	3,162,550	662,237	8,298	20.94	23.79	.....
1893.....	74	2,707,570	574,156	7,852	21.21	23.58	.....

The number of creameries (including skimming stations) operated in Ontario is reported as 282, being an increase of 68 over the previous season. Our efforts to secure returns were a little more successful than in previous years, the number reporting statistics being 93 (or 109 including skimming stations). Based upon these returns the butter made at the 282 creameries is 9,008,992 pounds, or 1,300,727 pounds in excess of the output of 214 creameries in the previous year. The patrons received \$1,294,220 for milk or cream supplied, being equivalent to 60.6 cents. per 100 pounds of milk. In the previous season it averaged 63.1.

CHEESE FACTORIES. The following table gives the statistics of 1,187 cheese factories operated in Ontario in 1898. These figures are given by groups of counties. Comparative figures are given for the Province for sixteen years:

Districts.	Number.	Quantity of—		Gross value of cheese.	Average No. of patrons.	Milk required to make 1 lb. of cheese.	Value of cheese per 100 lb.	Amount paid to patrons.	
		Milk used.	Cheese made.					Total.	Ave. per 100 lb. of milk.
		lb	lb	\$		lb	\$ c.	\$	cts.
Lake Erie....	1898	83 97,685,666	8,883,039	699,474	6,900	11.00	7 87	546,186	55.9
	1897	81 117,444,177	10,903,092	907,194	7,555	10.77	8 32	716,980	61.0
Lake Huron...	1898	56 52,091,510	4,719,165	383,231	4,452	11.04	8 12	297,877	57.2
	1897	60 72,718,347	6,689,569	558,217	5,231	10.87	8 34	428,373	58.9
Georgian Bay.	1898	30 16,913,919	1,554,838	122,328	1,615	10.88	7 87	93,049	55.0
	1897	33 23,178,632	2,389,121	197,007	1,883	10.54	8 25	153,919	61.1
West Midland	1898	143 258,148,383	23,448,953	1,888,982	11,278	11.01	8 06	1,550,386	60.1
	1897	144 313,698,478	28,972,817	2,453,638	12,161	10.83	8 47	2,032,746	64.8
Lake Ontario.	1898	107 134,119,750	12,527,143	987,721	7,645	10.71	7 88	774,288	57.7
	1897	105 145,693,784	13,580,350	1,151,419	7,677	10.68	8 48	924,545	63.7
St. Lawrence and Ottawa	1898	601 627,616,003	59,424,717	4,762,398	25,038	10.56	8 02	3,986,855	63.5
	1897	576 605,328,329	58,049,994	5,010,702	23,966	10.43	8 63	4,245,281	70.1
East Midland.	1898	156 184,813,384	17,276,430	1,385,700	7,797	10.70	8 02	1,155,195	62.5
	1897	153 173,776,150	16,520,939	1,420,285	7,353	10.52	8 60	1,193,312	68.7
Northern Districts	1898	11 3,010,867	282,637	21,905	376	10.65	7 75	13,699	45.5
	1897	9 2,689,251	257,034	21,106	278	10.46	8 21	13,848	51.5
The Province :									
1898	1,187	1,374,899,482	128,116,924	10,252,240	65,121	10.73	8 00	8,417,535	61.2
1897	1,161	1,455,937,148	137,362,916	11,719,468	66,104	10.60	8 53	9,709,004	66.6
1896	1,147	1,108,124,659	104,393,985	8,646,735	57,635	10.62	8 28	7,040,927	63.5
1895	1,164	1,174,008,592	109,230,346	8,607,889	65,661	10.75	7 88	6,922,962	59.0
1894	1,011	1,027,577,831	97,284,547	9,441,247	54,839	10.56	9 70	7,931,022	77.2
1893	897	911,791,204	86,166,719	8,338,769	50,870	10.58	9 68	.....	.....
1892	856	984,356,444	93,848,948	8,359,939	48,601	10.49	9 55	.....	.....
1891	838	865,453,574	81,929,042	7,656,484	45,066	10.56	9 35	.....	.....
1890	817	836,387,516	79,364,743	7,189,957	44,838	10.51	9 06	.....	.....
1889	784	760,146,327	72,592,847	6,787,619	43,215	10.47	9 35	.....	.....
1888	737	686,369,013	65,299,751	6,031,470	42,063	10.51	9 24	.....	.....
1887	737	691,934,579	65,638,656	6,918,913	42,512	10.54	10 54	.....	.....
1886	770	654,703,243	63,721,621	5,893,818	37,665	10.27	9 25	.....	.....
1885	752	733,437,254	71,209,719	5,781,569	44,200	10.30	8 12	.....	.....
1884	751	685,964,727	66,939,573	6,998,389	38,646	10.25	10 46	.....	.....
1883	635	539,696,197	53,513,032	5,589,339	32,636	10.08	10 45	.....	.....
Average 1883-98.	890	905,642,937	86,038,233	7,800,862	48,730	10.53	9 07	*8,004,290	*65.2

* Average for five years.

Notwithstanding the closing up of a number of factories there was a net increase in 1898 of 26. There was a decrease, however, in the make of cheese of over 9 million pounds from the great output of 1897, but the season of 1898 leads 1895, the next highest year, by nearly 19 million pounds. The average price of cheese, too, dropped over half a cent per pound, so that the patrons received but \$8,417,535 as compared with \$9,709,004 in 1897. This is equivalent to 61.2 cents per 100 pounds of milk, or 4 cents below the average of five years.

The output by counties is given on page 86. It will be seen that the western counties show considerable decreases, while many of the eastern counties give increases. Hastings with 96 factories produces 11,505,082 pounds, while Oxford with 9,922,553 pounds in 43 factories comes next.

STATISTICS OF

LIVE STOCK AND DAIRY PRODUCTS.

HORSES AND HOGS.

TABLE I. Showing by County Municipalities and groups of Counties the number of Horses and Hogs in Ontario in the years 1897 and 1898.

Counties.	Horses.					Hogs.			
	Working horses.	Breeding mares.	Unbroken horses.	Totals		Over 1 year.	Under 1 year.	Totals.	
				1898.	1897.			1898.	1897.
Essex	11,813	2,088	2,446	16,347	16,214	14,462	78,558	93,020	71,847
Kent	15,153	2,799	4,922	22,874	21,911	14,838	90,604	105,442	78,046
Elgin	11,313	1,741	2,978	16,032	16,078	8,317	57,498	66,415	51,461
Norfolk	9,647	1,487	1,859	12,993	13,143	6,660	33,014	39,674	30,630
Halimand	7,660	1,428	1,854	10,942	10,779	3,993	21,036	25,029	18,463
Welland	7,118	734	1,423	9,275	9,081	2,582	13,269	15,851	12,209
Totals	62,704	10,277	15,482	88,463	87,206	51,452	298,979	345,431	262,656
Lambton	12,142	2,576	3,467	18,185	17,636	7,965	51,511	59,476	43,131
Huron	17,354	4,793	5,995	28,142	28,038	8,804	54,287	63,091	48,958
Brace	14,210	3,047	3,717	20,974	21,089	7,741	38,862	46,603	34,794
Totals	43,706	10,416	13,179	67,301	66,763	24,510	144,660	169,170	126,883
Grey	19,027	3,743	4,203	26,973	27,107	9,692	52,124	61,816	47,249
Simcoe	18,826	3,815	4,953	27,594	27,846	13,353	72,912	86,265	68,119
Totals	37,853	7,558	9,156	54,567	54,953	23,045	125,036	148,081	115,368
Middlesex	19,004	3,810	5,619	28,433	28,896	10,394	63,899	74,193	61,009
Oxford	12,641	2,289	2,968	17,898	18,091	8,383	53,426	61,809	46,422
Brant	6,792	947	1,488	9,227	9,442	3,423	21,154	24,577	19,720
Perth	13,287	3,184	3,474	20,140	19,998	9,215	44,703	53,918	39,845
Wellington	14,966	3,059	3,735	21,780	22,045	8,321	50,539	58,860	44,834
Waterloo	8,879	1,457	1,752	12,088	12,333	4,648	31,503	36,151	28,186
Dufferin	6,951	1,303	1,831	10,085	10,234	5,157	27,647	32,804	25,413
Totals	82,535	16,049	21,067	119,651	121,045	49,441	292,871	342,312	265,429
Lincoln	6,904	709	1,005	8,618	9,005	2,866	13,218	16,104	12,117
Wentworth	8,702	1,074	2,033	11,809	11,819	3,267	23,619	26,826	20,009
Halton	6,306	812	1,323	8,441	8,605	2,260	15,641	17,901	15,749
Peel	8,275	1,456	2,191	11,962	12,415	4,477	25,584	30,061	23,758
York	15,915	2,663	3,356	22,134	22,845	8,304	51,086	59,390	48,455
Ontario	12,220	2,607	3,068	17,895	18,463	7,407	38,484	45,891	36,818
Durham	9,203	1,574	2,538	13,315	13,866	3,697	26,117	30,114	23,665
Northumberland	11,597	1,557	2,715	15,869	16,632	5,419	30,578	35,997	29,563
Prince Edward	7,212	1,031	1,273	9,516	9,688	2,439	12,661	15,120	11,191
Totals	86,334	13,723	19,502	119,559	123,278	40,396	237,008	277,404	221,265
Lennox and Add.	7,306	1,147	1,587	10,040	9,730	3,539	17,391	20,930	15,296
Frontenac	7,489	950	1,359	9,798	9,448	3,580	15,418	18,998	15,709
Leeds	8,207	1,036	1,088	10,331	10,228	5,808	24,334	30,142	23,570
Grenville	5,360	520	473	6,353	6,623	3,100	13,567	16,667	13,544
Dundas	5,691	344	972	7,507	7,404	3,589	17,128	20,717	15,846
Stormont	4,982	791	1,058	6,831	6,162	2,919	10,143	13,062	10,582
Glengarry	6,059	1,563	1,493	9,115	8,978	4,369	14,393	18,762	15,609
Prescott	4,783	1,229	1,430	7,442	7,154	4,063	9,852	13,915	11,936
Russell	3,528	904	987	5,419	4,753	2,721	7,104	9,825	8,583
Carleton	9,748	1,930	2,393	14,071	14,750	5,877	22,626	28,503	24,888
Renfrew	9,430	1,609	1,943	12,982	12,592	8,058	17,638	25,696	22,704
Lanark	7,615	1,258	1,337	10,210	10,365	4,132	18,038	22,170	19,696
Totals	80,198	13,781	16,120	110,099	108,187	51,755	187,632	239,387	197,833
Victoria	8,165	1,857	2,339	12,361	12,117	4,592	23,178	27,770	22,278
Peterborough	6,835	1,141	1,583	9,559	10,331	3,574	21,322	24,896	20,139
Haliburton	1,268	180	333	1,781	1,718	876	2,338	3,214	2,195
Hastings	12,814	1,586	2,264	16,664	16,900	10,328	33,569	43,897	32,140
Totals	29,082	4,764	6,519	40,365	41,066	19,370	80,407	99,777	77,132
Muskoka	2,396	338	436	3,170	3,150	1,077	3,331	4,408	4,044
Parry Sound	2,118	322	487	2,927	2,968	1,201	3,370	4,551	4,183
Nipissing	828	171	247	1,256	1,168	823	1,260	2,083	2,501
Manitoulin	1,292	253	372	1,917	1,938	984	3,432	4,416	4,070
Algoma	1,448	234	284	1,966	1,948	994	2,773	3,767	3,649
Totals	8,092	1,318	1,826	11,236	11,172	5,079	14,146	19,225	18,397
The Province...	430,504	77,886	102,351	611,241	613,670	265,048	1,375,739	1,640,787	1,284,963

CATTLE.

TABLE II. Showing by County Municipalities and groups of Counties the number of Cattle in Ontario in the years 1897 and 1898.

Counties.	Working oxen.	Milch cows.		Store cattle over 2 years.		Young and other cattle.	Total cattle.	
		1898.	1897.	1898.	1897.		1898.	1897.
Essex	124	17,959	17,250	7,283	7,852	17,696	43,062	42,088
Kent	23	20,367	19,753	12,739	10,598	26,379	59,503	53,969
Elgin	50	22,541	21,442	11,592	10,382	24,673	58,556	54,001
Norfolk	88	18,204	17,628	2,990	3,832	14,398	35,680	33,940
Haldimand	50	13,431	12,911	3,638	3,922	12,047	29,166	28,496
Welland	45	10,281	9,959	2,615	3,157	8,864	21,805	21,312
Totals	380	102,783	98,943	40,877	39,743	104,057	248,077	233,806
Lambton	4	21,569	21,455	17,947	16,781	32,316	71,836	68,905
Huron	33	33,506	32,727	25,427	27,624	50,737	109,703	110,528
Bruce	116	28,377	28,780	20,008	20,165	40,595	89,096	88,489
Totals	153	83,452	82,962	63,382	64,570	123,648	270,635	267,922
Grey	76	35,381	35,384	19,734	21,310	51,882	107,673	107,775
Simcoe	70	31,880	31,499	14,703	17,502	38,724	85,377	86,794
Totals	146	67,261	66,883	34,437	38,812	90,606	192,450	194,569
Middlesex	24	40,614	39,490	28,289	25,569	47,038	113,965	109,867
Oxford		38,021	36,960	13,072	12,883	27,887	78,980	74,035
Brant		12,580	12,443	2,734	3,062	11,344	26,658	26,391
Perth	14	33,281	31,930	15,560	16,889	38,327	87,182	84,731
Wellington		26,101	26,728	15,318	16,505	26,823	78,245	80,224
Waterloo	16	14,692	15,059	4,197	4,597	16,072	34,977	35,066
Dufferin	80	11,503	11,195	6,442	7,715	15,576	33,601	34,555
Totals	134	176,795	173,805	83,612	87,170	193,067	453,608	441,869
Lincoln		9,000	8,692	1,859	2,153	7,186	18,045	17,798
Wentworth	44	15,631	15,281	3,430	4,152	13,012	32,117	31,444
Halton	9	10,451	11,396	4,452	4,688	11,322	26,234	27,309
Peel		13,311	13,098	5,203	5,324	12,616	31,130	31,053
York		24,793	25,261	7,602	7,073	19,082	51,657	51,682
Ontario		19,990	19,908	8,061	9,674	26,706	54,757	56,312
Durham		15,520	14,729	5,848	6,383	16,946	38,314	38,573
Northumberland	28	25,401	24,864	4,786	6,004	18,614	48,829	48,476
Prince Edward		14,399	13,768	1,205	1,714	7,668	23,272	22,461
Totals	81	148,676	146,957	42,446	47,165	133,152	324,855	325,108
Lennox and Addington	40	19,382	18,562	3,286	3,313	11,963	34,671	32,822
Frontenac	20	25,351	23,114	4,642	4,852	14,226	44,239	40,497
Leeds	19	34,456	33,056	4,973	5,184	15,264	54,712	52,401
Grenville		20,808	19,724	1,709	2,211	8,889	31,406	30,187
Dundas		23,753	22,094	2,312	2,292	10,821	36,886	34,497
Stormont		21,017	19,221	2,226	2,559	8,905	32,248	30,281
Glengarry	20	27,311	25,161	3,340	4,506	13,401	44,072	42,820
Prescott	12	19,997	18,783	2,395	2,606	10,402	32,706	32,362
Russell		12,325	12,183	2,343	2,766	7,994	22,667	22,993
Carleton	15	31,925	31,472	10,391	10,231	22,677	65,009	63,060
Renfrew	50	23,803	22,788	10,782	10,390	25,531	60,166	59,431
Lanark	51	27,141	26,264	8,208	9,751	20,591	55,991	57,500
Totals	227	287,270	272,422	56,612	60,471	170,664	514,773	503,851
Victoria	17	14,675	14,436	7,586	7,490	21,245	43,523	42,423
Peterborough	17	18,874	18,936	3,861	5,372	15,478	38,230	39,376
Haliburton	97	3,424	3,369	1,160	1,414	4,601	9,282	9,336
Hastings	10	44,421	44,318	5,175	6,055	22,697	72,303	72,183
Totals	141	81,394	81,059	17,782	20,331	64,021	163,338	163,183
Muskoka	171	5,661	5,798	1,962	2,184	6,894	14,688	15,211
Parry Sound	84	4,802	4,545	1,719	1,851	6,896	13,501	13,009
Nipissing	73	1,642	1,564	616	568	2,051	4,382	4,163
Manitoulin	82	2,761	2,820	1,291	1,399	4,551	8,685	9,157
Algoma	108	2,524	2,478	979	1,142	3,840	7,451	7,277
Totals	518	17,390	17,205	6,567	7,144	24,232	48,707	48,883
The Provinces	180	905,021	940,235	345,695	365,406	993,447	2,915,943	2,182,326

SHEEP AND POULTRY.

TABLE III. Showing by County Municipalities and groups of Counties the number of Sheep and Poultry in Ontario in the years 1897 and 1898.

Counties.	Sheep.				Poultry.				
	Over 1 year.	Under 1 year.	Totals.		Turkeys	Geese.	Other Fowls	Totals.	
			1898.	1897.				1898.	1897.
Essex	16,495	13,947	30,440	30,834	27,231	13,828	245,832	286,891	295,827
Kent	24,904	22,188	47,092	41,312	35,905	12,820	292,690	341,415	311,354
Elgin	26,277	23,066	49,343	45,533	30,752	9,335	212,581	252,668	235,473
Norfolk	15,633	13,605	29,238	29,745	24,425	6,206	172,550	162,484	182,353
Haldimand	14,882	13,000	27,882	27,043	13,098	6,387	131,304	151,389	138,377
Welland	10,399	9,204	19,703	21,062	12,066	2,449	129,258	144,673	131,398
Totals...	108,288	95,110	203,398	195,529	144,977	51,025	1,184,018	1,380,020	1,294,782
Lambton	24,543	23,653	48,196	52,987	40,901	11,243	265,612	317,756	294,874
Huron	41,729	41,872	83,601	87,585	48,972	22,857	343,844	415,673	400,376
Bruce	47,104	47,941	95,041	94,917	31,224	17,858	221,819	270,501	266,630
Totals...	113,372	113,466	226,838	235,689	121,097	51,958	831,275	1,004,380	961,880
Grey	56,323	52,375	108,698	110,973	45,918	22,658	300,393	308,569	342,629
Simcoe	51,062	44,884	95,246	103,915	36,518	29,168	306,651	372,337	349,539
Totals...	107,385	96,559	203,944	214,888	82,436	51,826	607,044	741,506	692,168
Middlesex	35,124	31,100	66,224	63,410	64,058	20,190	468,862	493,110	468,420
Oxford	10,644	10,267	20,907	19,850	28,849	7,430	278,543	264,824	242,565
Brant	9,886	9,147	18,733	16,788	11,039	4,265	107,444	122,748	105,733
Perth	22,396	22,419	45,015	46,760	29,884	17,627	260,683	307,692	287,670
Wellington	42,663	39,539	82,202	84,016	30,573	19,055	243,069	252,777	273,733
Waterloo	14,363	12,736	27,119	26,711	11,074	4,721	159,615	175,410	172,428
Dufferin	18,260	17,569	35,829	34,883	20,434	13,349	126,284	160,063	147,208
Totals...	153,232	142,797	296,029	292,408	195,409	86,677	1,534,498	1,816,584	1,697,457
Lincoln	8,351	8,624	16,975	18,773	8,721	3,074	110,142	121,937	107,891
Wentworth	11,274	10,051	21,325	19,146	13,097	5,180	125,072	143,349	133,173
Halton	10,475	9,854	20,329	19,932	14,731	7,984	102,464	125,179	115,279
Peel	10,059	8,808	18,867	20,909	20,685	12,412	167,999	201,090	183,249
York	21,890	19,293	41,183	43,476	22,097	13,716	249,647	285,460	274,211
Ontario	24,574	20,201	44,775	45,853	21,050	15,604	220,384	257,638	259,109
Durham	20,314	17,765	38,079	36,923	19,441	10,920	158,911	169,272	184,199
Northumb'rd	15,917	14,208	30,125	31,454	22,098	8,641	188,226	218,965	194,266
Prince Edw'd	4,890	5,267	10,157	11,765	11,666	2,838	169,223	123,729	107,909
Totals...	127,744	114,071	241,815	248,231	154,186	80,369	1,432,070	1,666,625	1,559,286
Lennox & Add	11,356	9,871	21,227	16,923	11,130	5,752	109,795	126,677	110,000
Frontenac	13,538	12,496	26,034	29,991	20,110	8,450	112,833	141,393	126,617
Leeds	10,638	10,428	21,066	24,234	28,481	7,752	141,838	178,071	148,403
Grenville	6,476	7,082	13,528	13,977	23,826	5,327	94,126	112,779	118,172
Dundas	5,817	5,607	11,424	12,715	22,115	6,519	125,476	154,104	134,449
Stormont	5,630	4,697	10,327	11,190	15,488	5,467	99,286	120,179	103,917
Glengarry	11,126	9,573	20,699	20,991	11,479	5,577	115,747	132,803	110,171
Prescott	8,744	7,567	16,311	15,000	17,530	3,636	92,305	113,471	89,075
Russell	7,804	7,031	14,835	11,656	8,901	4,478	57,379	71,258	70,267
Carleton	20,471	18,642	39,113	41,056	36,296	15,902	184,505	226,703	219,243
Renfrew	20,100	32,664	71,764	69,317	19,411	11,884	122,313	153,578	145,249
Lanark	29,121	27,634	56,755	59,264	19,945	9,767	130,190	159,962	152,354
Totals...	169,821	153,262	323,083	326,314	234,210	90,421	1,386,287	1,710,918	1,527,917
Victoria	24,630	20,306	44,936	43,478	24,419	11,079	145,363	180,861	161,197
Peterborough	13,538	12,080	25,638	26,255	24,221	11,452	136,263	171,906	168,679
Haliburton	5,395	4,421	9,816	9,266	3,811	1,466	17,292	22,136	18,781
Hastings	19,250	17,514	36,764	37,981	21,795	9,496	206,062	237,293	216,185
Totals...	62,833	54,321	117,154	116,899	73,816	33,490	504,920	612,226	564,242
Muskoka	10,703	8,461	19,164	18,093	5,657	1,844	36,483	43,984	42,279
Parry Sound	9,822	8,943	18,775	16,302	5,285	3,687	30,881	39,253	34,849
Nipissing	198	675	1,673	2,276	1,310	314	13,184	14,817	14,234
Manitoulin	8,866	7,762	16,628	16,208	2,564	1,643	20,419	24,626	21,351
Algoma	4,798	3,715	8,513	7,513	3,329	1,681	24,574	29,584	24,896
Totals...	35,197	29,556	64,753	60,392	18,154	8,669	125,541	152,264	137,609
The Province	877,872	799,142	1,677,014	1,690,350	1,024,285	454,335	7,605,653	9,084,273	8,435,341

LIVE STOCK SOLD.

TABLE IV. Showing by County Municipalities and groups of Counties the number of Horses, Cattle, Sheep, Hogs and Poultry sold in the Province of Ontario in the years 1897 and 1898, ending June 30th of each year.

Counties.	Horses.		Cattle.		Sheep.		Hogs.		Poultry.
	1898.	1897.	1898.	1897.	1898.	1897.	1898.	1897.	1898.
Essex	839	856	10,216	7,600	10,622	11,018	62,963	55,110	119,348
Kent	1,715	1,562	14,870	12,432	17,261	16,025	91,200	70,477	121,424
Elgin	1,266	1,240	14,350	14,868	22,727	22,360	66,743	60,369	101,723
Norfolk	988	803	7,146	7,711	11,029	14,907	40,228	37,454	62,931
Haldimand	782	712	7,118	6,771	10,683	12,530	25,228	21,986	75,206
Welland	477	506	5,636	4,874	10,230	10,548	15,685	13,852	70,809
Totals	6,067	5,677	59,336	54,256	80,552	87,388	301,857	259,248	561,509
Lambton	1,277	1,456	21,598	20,029	18,606	22,616	55,222	45,919	96,701
Huron	3,104	3,058	34,463	32,479	37,429	44,378	70,572	64,581	118,779
Bruce	1,847	1,734	27,316	27,439	38,582	46,117	49,638	42,835	82,291
Totals	6,228	6,258	83,377	79,947	94,617	113,111	175,432	152,335	297,771
Grey	2,040	2,342	28,757	31,361	39,061	53,148	59,732	53,836	106,723
Simcoe	2,082	2,198	25,335	20,608	38,044	37,812	84,430	66,515	149,593
Totals	4,122	4,540	54,092	51,969	77,105	90,960	144,162	120,345	216,316
Middlesex	2,256	1,980	36,555	30,262	27,764	27,077	82,655	69,918	177,105
Oxford	1,267	1,416	23,434	20,571	10,304	11,289	68,587	61,132	87,541
Brant	430	482	6,822	6,182	7,064	8,131	24,679	28,527	41,545
Perth	1,673	1,775	23,479	21,461	18,153	20,613	60,677	51,355	73,999
Wellington	1,573	1,579	26,098	23,769	33,384	34,239	66,340	59,353	94,498
Waterloo	790	882	15,774	13,643	13,653	12,712	39,118	38,189	54,601
Dufferin	940	1,016	10,700	9,949	13,513	15,284	35,472	26,762	55,600
Totals	8,929	9,138	143,462	125,837	123,805	129,345	377,528	335,236	582,890
Lincoln	539	510	5,422	4,971	10,550	10,710	17,750	15,638	63,147
Wentworth	646	415	8,658	7,615	9,179	9,730	28,918	24,490	69,409
Halton	488	521	6,919	6,380	8,676	8,623	21,680	21,791	36,827
Peel	890	992	8,275	7,056	7,989	11,427	34,551	29,751	101,575
York	1,660	1,749	16,935	14,560	25,202	22,300	70,655	62,498	102,713
Ontario	1,548	1,620	15,726	14,653	15,077	17,835	51,838	46,962	85,628
Durham	1,153	1,127	12,212	9,361	13,377	14,469	28,149	26,613	52,511
Northumberland	971	1,030	10,596	10,512	10,583	12,691	33,495	33,454	71,799
Prince Edward	508	484	3,108	3,064	6,661	7,569	15,462	12,312	32,890
Totals	8,403	8,448	87,281	78,174	106,694	115,354	302,498	273,509	658,299
Lennox and Add.	1,044	711	7,272	6,247	8,510	9,301	22,073	16,063	43,169
Frontenac	313	316	6,524	6,119	10,759	13,702	16,241	14,083	62,745
Leeds	497	488	6,235	6,944	7,133	10,611	22,914	17,931	51,694
Grenville	320	232	4,150	3,789	4,662	5,876	10,749	9,592	32,292
Dundas	438	517	5,021	5,633	4,567	6,057	16,233	12,752	43,351
Stormont	439	326	4,179	3,417	5,042	5,603	10,971	10,024	32,865
Glengarry	741	456	6,116	4,615	7,750	7,228	12,196	11,550	38,763
Prescott	474	503	4,228	3,745	5,941	6,146	7,938	7,611	37,099
Russell	344	248	3,391	2,980	6,970	5,982	8,178	6,176	23,448
Carleton	1,110	856	11,464	8,992	16,439	16,689	21,012	20,439	91,652
Renfrew	659	677	10,807	10,016	21,303	21,948	15,487	14,954	45,703
Lennox	706	610	11,187	10,114	22,484	23,491	17,538	15,465	46,370
Totals	7,085	5,970	80,574	72,611	121,563	132,634	181,530	156,780	550,991
Victoria	1,030	936	11,952	9,774	14,810	16,722	26,800	24,460	53,372
Peterborough	700	729	7,947	6,761	9,311	9,963	29,750	23,510	49,423
Haliburton	184	199	2,636	2,065	3,542	2,996	2,608	2,099	6,728
Hastings	758	816	10,401	11,176	10,948	15,074	34,077	31,381	71,400
Totals	2,672	2,680	33,436	29,719	38,611	44,555	93,275	84,450	182,823
Muskoka	224	224	3,561	3,335	7,254	5,731	4,144	4,350	16,978
Parry Sound	319	257	3,049	3,122	5,908	5,345	4,445	4,773	11,685
Nipissing	70	65	724	595	449	443	1,116	1,260	6,098
Manitoulin	150	126	2,080	1,897	5,499	5,817	3,756	3,828	8,748
Algoma	135	140	1,513	1,545	2,182	2,189	2,954	3,883	9,330
Totals	838	812	10,927	10,494	21,292	19,525	16,415	18,064	52,159
The Province	44,404	43,511	552,485	503,007	664,239	732,872	1,592,697	1,399,967	3,072,767

The total number of Poultry sold in 1897 was 2,965,221.

WOOL.

TABLE V. Showing by County Municipalities and groups of Counties the clip of wool in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98; also the average number of pounds per fleece.

Counties.	1898.			1897.			Yearly average for the seventeen years 1882-98.		
	No. of fleeces.	Pounds.	Lb. per fleece.	No. of fleeces.	Pounds.	Lb. per fleece.	No. of fleeces.	Pounds.	Lb. per fleece.
Essex	15,046	86,191	5.72	15,963	92,232	5.78	14,914	84,849	5.69
Kent	24,292	160,532	6.61	22,015	147,787	6.71	21,175	125,498	5.93
Elgin	25,454	155,811	6.12	23,133	139,110	6.01	24,272	142,060	5.85
Norfolk	15,237	88,650	5.49	15,834	84,620	5.34	17,419	93,552	5.37
Haldimand	14,208	89,053	6.27	14,026	83,645	5.96	16,986	102,099	6.01
Welland	10,089	54,265	5.38	11,374	56,416	4.96	13,370	67,293	5.03
Totals	104,326	629,492	6.03	102,345	603,820	5.90	108,136	615,351	5.69
Lambton	23,934	147,830	6.18	26,304	160,213	6.09	26,891	158,677	5.90
Huron	41,597	250,745	6.03	43,267	254,912	5.89	49,866	267,735	5.77
Bruce	46,228	287,900	6.22	47,388	281,997	5.95	51,226	297,004	5.81
Totals	111,759	686,475	6.14	116,959	697,122	5.96	127,983	744,016	5.81
Grey	56,593	334,885	5.91	57,247	333,680	5.83	71,145	400,809	5.63
Simcoe	50,534	303,527	6.01	56,705	330,829	5.83	49,404	279,675	5.66
Totals	107,127	638,416	5.96	113,952	664,509	5.83	120,549	680,484	5.64
Middlesex	34,781	224,679	6.46	32,742	213,544	6.52	38,063	232,947	6.12
Oxford	11,042	70,997	6.43	10,373	65,225	6.29	16,848	97,898	5.81
Brant	9,275	54,291	5.85	8,823	51,515	5.84	12,422	71,780	5.78
Perth	21,963	127,800	5.82	23,263	131,985	5.67	29,979	172,212	5.74
Wellington	41,829	263,617	6.30	43,993	266,889	6.07	47,341	276,658	5.84
Waterloo	14,294	77,490	5.42	13,759	75,133	5.46	20,389	111,608	5.47
Dufferin	17,968	112,539	6.27	18,686	113,397	6.07	18,568	107,626	5.80
Totals	151,152	931,413	6.16	151,639	917,688	6.05	183,610	1,070,729	5.83
Lincoln	8,308	45,780	5.51	9,844	50,727	5.15	10,758	55,626	5.17
Wentworth	11,268	70,959	6.30	10,381	62,506	6.02	14,434	81,276	5.83
Halton	10,427	69,473	6.67	10,439	67,731	6.49	11,571	73,426	6.35
Peel	10,347	67,522	6.52	11,633	76,535	6.58	15,075	98,817	6.56
York	21,786	144,612	6.64	24,322	160,302	6.59	27,104	166,188	6.13
Ontario	24,363	170,842	7.01	24,076	161,049	6.69	26,657	166,790	6.26
Durham	19,874	129,315	6.51	19,100	117,810	6.17	21,233	125,938	5.93
Northumberland	16,078	95,451	5.93	16,712	102,446	6.14	19,551	113,327	5.80
Prince Edward	4,797	25,822	5.38	5,785	29,621	5.12	8,305	44,036	5.30
Totals	127,248	819,806	6.44	132,292	828,957	6.27	154,718	928,424	6.00
Lennox and Addington	11,024	60,316	5.47	9,554	51,889	5.43	13,571	72,319	5.33
Frontenac	13,415	73,451	5.48	15,600	81,950	5.25	17,334	88,691	5.12
Leeds	10,399	55,002	5.29	12,153	63,171	5.20	30,795	152,695	4.96
Grenville	6,244	33,781	5.42	6,681	35,776	5.35			
Dundas	6,009	32,513	5.41	6,673	34,240	5.13	8,858	45,166	5.10
Stormont	5,545	31,975	5.75	6,449	36,571	5.67	8,810	46,446	5.27
Glengarry	10,678	56,524	5.29	10,902	56,342	5.17	13,720	67,639	4.93
Prescott	8,948	45,417	5.07	8,663	45,786	5.29	10,315	52,615	5.10
Russell	7,676	42,806	5.57	6,815	36,187	5.31	7,972	40,696	5.10
Carleton	20,116	109,088	5.42	22,107	120,703	5.46	26,039	135,301	5.19
Renfrew	37,346	176,804	4.73	35,900	168,082	4.68	37,827	177,013	4.67
Lenark	29,239	148,103	5.05	31,194	160,661	5.15	33,433	164,434	4.92
Totals	166,689	865,708	5.19	172,691	891,358	5.16	208,804	1,043,035	5.00
Victoria	24,298	143,231	5.89	24,133	144,723	6.00	23,040	130,289	5.65
Peterborough	13,743	79,014	5.75	13,916	79,655	5.72	16,317	87,766	5.38
Haliburton	5,372	26,765	4.98	5,127	26,087	5.09	4,077	20,118	4.93
Hastings	18,759	97,821	5.21	19,645	102,818	5.23	23,857	119,294	5.00
Totals	62,172	346,831	5.58	62,821	353,283	5.62	67,291	357,467	5.31
Muskoka	10,804	50,239	4.88	10,801	51,918	4.81	7,350	37,713	5.13
Parry Sound	9,860	53,748	5.45	9,084	50,229	5.53	4,958	27,756	5.60
Nipissing	954	4,897	5.13	1,399	6,629	4.74	503	2,447	4.86
Manitoulin	9,125	51,954	5.69	8,730	49,392	5.65	7,042	41,329	5.87
Algoma	4,483	25,707	5.76	4,200	25,079	5.85			
Totals	34,706	186,545	5.38	34,304	183,247	5.34	19,853	109,245	5.50
The Province	865,179	5,104,686	5.90	887,003	5,139,984	5.79	990,944	5,548,751	5.60

BEES.

TABLE VI. Showing by County Municipalities and groups of Counties the number and value per Hive of Bees in Ontario, and also the value per hive in the years 1896, 1897 and 1898.

Counties.	1898.			1897.			1896.		
	No. of hives.	Value of bees and outfit.	Value per hive.	No. of hives.	Value of bees and outfit.	Value per hive.	No. of hives.	Value of bees and outfit.	Value per hive.
Essex	6,705	28,362	4 23	4,657	18,675	4 01	4,122	18,260	4 43
Kent	6,349	30,635	4 81	4,921	24,654	5 01	3,506	18,196	5 19
Elgin	4,602	21,721	4 72	3,854	18,037	4 68	4,543	23,487	5 17
Norfolk	7,749	44,324	5 72	6,123	31,044	5 06	5,689	31,745	5 58
Haldimand	5,073	26,887	5 30	4,160	20,093	4 83	2,651	14,819	5 59
Welland	4,978	25,836	5 19	3,040	14,866	4 89	2,596	13,759	5 30
Totals	35,476	177,765	5 01	26,755	130,369	4 87	23,107	120,266	5 20
Lambton	8,040	42,934	5 34	7,488	39,087	5 22	5,898	30,257	5 13
Huron	6,215	38,347	6 17	4,200	26,418	6 29	4,513	26,807	5 94
Bruce	4,335	26,010	6 00	4,776	28,656	6 00	3,995	23,371	5 85
Totals	18,590	107,291	5 77	16,464	94,161	5 72	14,406	80,435	5 58
Grey	5,282	33,613	6 25	5,956	39,190	6 58	4,814	27,151	5 64
Simcoe	3,811	19,855	5 21	5,157	28,776	5 59	4,533	25,249	5 57
Totals	9,093	52,868	5 81	11,113	67,966	6 12	9,347	52,400	5 61
Middlesex	11,596	58,414	5 04	6,631	37,797	5 70	6,623	42,652	6 44
Oxford	4,888	27,987	6 10	3,653	21,187	5 80	2,380	14,935	6 41
Brant	5,376	29,030	5 40	3,611	20,149	5 58	2,380	12,947	5 44
Perth	3,888	17,414	5 14	3,073	16,134	5 21	3,572	17,596	4 87
Wellington	2,242	13,900	6 20	1,819	11,460	6 30	1,449	8,143	5 62
Waterloo	1,336	7,575	5 67	989	6,181	6 25	1,176	7,797	6 63
Dufferin	3,713	21,350	5 75	3,232	18,228	5 64	2,665	16,070	6 03
Totals	32,239	175,700	5 45	23,014	131,136	5 70	20,195	119,940	5 94
Lincoln	1,647	9,075	5 51	1,197	7,290	6 09	1,542	8,219	5 33
Wentworth	3,638	18,836	5 20	2,182	12,939	5 93	2,364	15,059	6 37
Halton	959	4,968	5 18	1,033	5,578	5 40	1,475	9,322	6 32
Peel	2,714	16,067	5 92	1,679	10,410	6 20	2,036	12,399	6 09
York	5,894	35,718	6 06	4,260	29,351	6 89	3,480	23,699	6 81
Ontario	2,610	16,991	6 51	3,301	20,202	6 12	3,682	19,956	5 42
Durham	2,309	12,446	5 39	2,571	12,958	5 04	2,806	15,209	5 42
Northumberland	8,178	38,846	4 75	8,230	39,998	4 86	8,931	42,779	4 79
Prince Edward	1,692	8,443	4 99	1,872	9,547	5 10	3,109	15,483	4 98
Totals	29,041	161,390	5 56	26,325	113,273	5 63	29,425	162,125	5 51
Lennox and Addington	4,724	21,494	4 55	5,373	25,575	4 76	4,377	22,804	5 21
Frontenac	2,324	13,712	5 90	3,186	18,288	5 74	2,919	17,222	5 90
Leeds	8,137	41,010	5 04	5,264	25,530	4 85	5,797	28,289	4 88
Grenville	4,781	21,515	4 50	2,691	11,168	4 15	1,903	7,916	4 16
Dundas	4,380	20,148	4 60	3,404	16,513	4 86	2,947	15,472	5 25
Stormont	1,394	7,765	5 57	1,835	10,660	5 82	1,985	10,421	5 25
Glengarry	8,619	41,113	4 77	8,207	40,953	4 99	6,164	29,094	4 72
Prescott	4,932	27,915	5 66	4,805	23,641	4 92	4,534	22,815	5 24
Russell	1,960	10,016	5 11	2,116	10,263	4 85	2,180	10,224	4 69
Carleton	3,554	17,521	4 93	5,024	25,070	4 99	6,293	31,906	5 07
Renfrew	4,316	18,904	4 38	3,690	18,413	4 99	4,336	21,897	5 05
Lennox	5,661	23,323	4 12	5,105	22,615	4 43	5,296	23,461	4 43
Totals	54,782	264,436	4 83	50,700	248,739	4 91	48,551	241,521	4 97
Victoria	1,686	9,897	5 87	4,580	22,900	5 00	6,007	28,834	4 80
Peterborough	1,676	7,710	4 60	1,874	8,564	4 57	1,565	8,670	5 54
Haliburton	155	775	5 00	52	260	5 00	80	400	5 00
Hastings	5,607	31,053	5 54	4,835	26,855	5 52	6,272	33,053	5 27
Totals	9,124	49,445	5 42	11,371	58,579	5 15	13,924	70,957	5 10
Muskoka	492	2,298	4 67	414	2,047	4 61	529	3,296	6 23
Parry Sound	207	1,304	6 30	146	994	6 81	178	1,157	6 50
Nipissing	8	40	5 00				8	40	5 00
Manitoulin	820	4,264	5 20	454	2,765	6 09	397	2,219	5 59
Algoma	208	1,248	6 00	25	167	6 69	9	52	5 81
Totals	1,735	9,154	5 28	1,069	5,973	5 59	1,121	6,764	6 03
The Province	190,080	998,049	5 25	166,811	885,196	5 31	160,076	854,408	5 34

FACTORY CHEESE.

TABLE VII. Showing by county municipalities and group of counties the quantity and value of cheese made at 1,187 factories in Ontario in 1898, the amount paid to patrons, etc.

Counties.	Factories in operation	Quantity of		Gross value of cheese.	No. of patrons.	Milk required to make 1 lb. cheese.	Value of cheese per 100 lb.	Total amount paid to patrons.	Paid to patrons per 100 lb. of milk.
		Milk used.	Cheese made.						
	No.	lb.	lb.	\$		lb.	\$ c.	\$	cts.
Essex	12	5,659,502	517,055	38,796	724	10 95	7 50	28,687	50.7
Kent	7	4,239,787	389,677	30,480	263	10.88	7 82	21,424	50.5
Elgin	24	37,516,915	3,892,575	268,484	1,842	11.07	7 91	219,670	58.5
Norfolk	24	28,030,049	2,552,224	199,535	2,121	10 98	7 82	153,601	54.8
Haldimand	13	18,642,232	1,708,702	136,020	1,508	10.91	7 96	103,338	55.4
Welland	3	3,567,181	322,806	26,159	342	11.06	8 10	19,466	54.6
Totals	83	97,685,666	8,883,039	699,474	6,900	11.00	7 87	546,186	55.9
Lambton	19	13,917,294	1,260,291	100,286	1,468	11.07	7 96	73,671	52.8
Huron	18	18,640,743	1,673,848	137,801	1,390	11.14	8 23	110,104	59.1
Bruce	19	19,503,473	1,785,026	145,144	1,594	10.93	8 13	114,102	58.5
Totals	56	52,091,510	4,719,165	383,231	4,452	11.04	8 12	297,877	57.2
Grey	15	9,969,939	915,610	72,343	859	10.89	7 90	55,191	55.4
Simcoe	15	6,946,980	639,228	49,985	756	10.87	7 82	37,858	55.5
Totals	30	16,913,919	1,554,838	122,328	1,615	10.88	7 87	93,049	55.0
Middlesex	37	55,268,977	4,947,438	398,734	2,500	11.08	7 99	323,968	58.6
Oxford	43	109,017,673	9,922,553	800,912	3,568	11.99	8 07	680,713	62.4
Brant	9	9,555,370	858,348	67,142	581	11.13	7 82	51,074	53.5
Perth	26	53,783,417	4,881,914	398,650	2,649	11.02	8 17	322,304	59.9
Wellington	13	17,328,907	1,564,823	127,333	1,092	11.07	8 14	99,667	57.5
Waterloo	9	8,691,018	817,065	63,451	622	10.64	7 77	47,706	54.9
Dufferin	6	4,503,021	416,814	32,680	256	10.80	7 84	24,954	55.4
Totals	143	258,148,383	23,448,955	1,888,982	11,278	11.01	8 06	1,550,386	60.1
Lincoln	3	4,476,202	404,231	32,175	409	11.07	7 96	23,749	53.1
Wentworth	7	7,852,395	713,239	57,203	514	11.01	8 02	42,075	53.6
Halton	1	695,763	62,384	4,911	53	11.16	7 87	4,037	58.0
Peel	5	2,596,615	248,059	19,446	126	10.47	7 84	15,234	58.7
York	8	6,125,848	519,809	43,808	529	11.14	7 97	33,093	54.0
Ontario	4	1,883,834	171,574	13,669	216	11.01	7 97	9,561	50.6
Durham	13	14,095,623	1,276,563	103,142	994	11.04	8 08	76,422	54.2
Northumberland	42	60,932,245	5,791,805	455,541	2,908	10.52	7 87	371,004	60.9
Prince Edward	24	35,455,195	3,309,479	257,826	1,891	10.71	7 79	199,113	56.2
Totals	107	134,119,750	12,527,143	987,721	7,645	10.71	7 88	774,288	57.7
Lennox and Addington	30	55,965,752	5,364,654	426,987	2,562	10.43	7 96	341,169	61.0
Frontenac	73	60,043,426	5,756,743	465,431	2,677	10.43	8 08	381,023	63.5
Leeds	80	101,199,474	9,481,996	769,508	3,022	10.67	8 12	665,218	65.7
Greenville	38	52,883,852	4,954,697	399,710	2,040	10.67	8 07	334,768	63.3
Dundas	56	65,119,095	6,165,097	491,481	1,970	10.56	7 97	420,393	64.6
Stormont	45	50,940,089	4,882,492	387,801	1,905	10.43	7 94	330,479	61.9
Glengarry	52	32,044,615	2,962,228	234,177	1,306	10.79	7 89	196,963	64.5
Prescott	62	41,090,893	3,985,126	313,393	1,907	10.31	7 86	262,081	63.8
Russell	43	41,825,141	4,008,069	314,423	1,714	10.44	7 84	271,115	64.8
Carleton	57	53,119,939	4,960,588	404,778	2,374	10.71	8 16	339,881	64.0
Renfrew	22	16,794,464	1,608,806	127,443	1,124	10.44	7 92	93,038	55.4
Lanark	43	56,584,263	5,283,921	427,766	2,457	10.70	8 09	350,727	62.0
Totals	601	627,616,003	59,424,717	4,762,898	25,058	10.56	8 02	3,986,855	63.5
Victoria	18	15,552,324	1,437,606	114,472	1,149	10.82	7 96	88,899	57.2
Peterborough	36	45,209,998	4,150,222	332,247	2,124	10.89	8 01	268,916	59.5
Haliburton	6	1,837,440	183,520	14,776	128	10.28	8 05	11,624	61.6
Hastings	96	122,163,622	11,505,082	924,205	4,396	10.62	8 03	785,756	64.3
Totals	156	184,813,334	17,276,430	1,385,700	7,797	10.70	8 02	1,155,195	62.5
Muskoka	3	1,216,279	113,402	8,668	150	10.73	7 64	5,693	46.8
Parry Sound	6	1,331,566	125,070	9,933	153	10.71	7 94	5,949	44.4
Manitoulin	1	334,614	32,327	2,279	29	10.35	7 05	1,455	43.5
Algoma	1	120,408	11,838	1,026	44	10.17	8 67	602	50.0
Totals	11	3,010,867	283,637	21,906	376	10.65	7 75	13,699	45.5
The Province	1,187	1,374,399,482	128,116,924	10,252,240	65,121	10.73	8 00	8,417,535	61.2

PART III.

VALUES, RENTS AND FARM WAGES.

VALUES OF FARM PROPERTY.

VALUES OF FARM PROPERTY. The values of farm lands, buildings, implements and live stock are given in the following table by county groups for 1897 and 1898, and for the Province for each of the sixteen years, 1883-98 :

Districts.	Farm land.	Buildings.	Implements.	Live stock.	Total farm property.
	\$	\$	\$	\$	\$
Lake Erie	{ 1898 78,880,118 1897 78,671,601	28,802,870 28,165,204	7,466,868 7,285,555	14,057,563 12,086,804	129,207,419 126,209,164
Lake Huron	{ 1898 63,867,428 1897 63,256,194	21,960,692 21,520,339	5,766,102 5,583,061	12,647,483 11,428,589	104,241,705 101,788,233
Georgian Bay.....	{ 1898 43,101,096 1897 42,713,156	15,950,763 15,730,513	4,552,343 4,414,029	9,026,165 8,249,360	72,630,367 71,107,058
West Midland	{ 1898 116,251,884 1897 116,184,328	45,002,257 44,619,626	10,499,657 10,177,878	22,024,590 19,390,350	193,781,388 190,372,182
Lake Ontario	{ 1898 115,346,834 1897 115,757,971	46,049,081 45,283,916	10,277,496 9,958,770	17,940,862 16,498,245	189,614,273 187,498,902
St. Lawrence and Ottawa	{ 1898 97,081,275 1897 96,231,088	38,035,154 36,706,694	10,352,443 9,892,534	19,508,163 18,069,571	164,977,035 160,899,887
East Midland.....	{ 1898 34,116,170 1897 33,793,194	11,803,032 11,739,269	3,225,347 3,181,964	6,519,094 6,008,109	55,663,643 54,722,536
Northern Districts	{ 1898 7,598,764 1897 7,447,020	2,450,547 2,324,548	836,976 805,307	2,020,303 1,918,776	12,906,590 12,495,651
The Province.....	{ 1898 556,246,569	210,054,396	52,977,232	103,744,223	923,022,420
	{ 1897 554,054,552	206,090,159	51,290,098	93,619,804	905,093,613
	{ 1896 557,468,270	205,235,429	50,730,858	96,857,566	910,291,623
	{ 1895 572,938,472	204,148,670	50,944,385	103,958,047	931,989,574
	{ 1894 587,246,117	204,071,566	51,530,172	111,547,652	951,395,507
	{ 1893 602,664,361	200,189,888	51,435,919	116,070,902	970,361,070
	{ 1892 615,828,471	195,644,258	51,003,020	117,501,495	979,977,244
	{ 1891 621,245,223	191,268,327	50,651,442	108,721,076	971,886,068
	{ 1890 622,888,000	193,438,826	50,515,583	104,086,626	970,927,035
	{ 1889 632,329,453	192,464,237	51,685,706	105,731,288	982,210,664
	{ 1888 640,480,801	188,293,226	49,754,832	102,839,235	981,368,094
	{ 1887 636,883,755	184,753,507	49,248,297	104,406,635	975,292,214
	{ 1886 648,009,828	183,748,212	50,530,936	107,208,935	989,497,911
	{ 1885 626,422,024	182,477,905	48,569,725	100,690,086	958,159,740
	{ 1884 625,478,706	173,386,925	47,830,710	103,106,829	949,803,170
	{ 1883 654,793,025	163,030,675	43,522,530	100,082,365	961,428,595

Each of the districts have an increase in the total value of farm property ; in fact, the only group of counties failing to show an increase in each of the four items given is

the Lake Ontario group, which failed to equal its own figures for value of land. Taking the figures for the Province, an increase is noted in the value of each of the four items, the improvement in the value of farm land being the first made since 1886. The value of all farm property (crops excepted) is now placed at \$923,022 420, being an increase of \$17,928,807, and the first gain in the value of total property since 1892.

VALUE PER ACRE OCCUPIED. The following table gives the value per acre occupied of the various classes of farm property by county groups and for the Province for the years 1897 and 1898:

Districts.	Farm lands		Buildings.		Implements.		Live stock.		Total farm property.	
	1898.	1897.	1898.	1897.	1898.	1897.	1898.	1897.	1898.	1897.
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Lake Erie	33 74	33 59	12 32	12 02	3 19	3 11	6 01	5 16	55 26	53 88
Lake Huron	27 45	27 15	9 44	9 24	2 48	2 40	5 43	4 90	44 80	43 69
Georgian Bay	21 51	21 07	7 89	7 76	2 25	2 17	4 46	4 07	35 91	35 07
West Midland	35 72	35 75	13 83	13 72	3 22	3 13	6 77	5 96	49 84	58 54
Lake Ontario	37 81	37 97	15 09	14 86	3 37	3 27	5 88	5 41	62 15	61 51
St. Lawrence and Ottawa.	18 05	17 87	7 07	6 82	1 92	1 84	3 63	3 36	50 67	29 89
East Midland	12 39	12 37	4 28	4 30	1 17	1 17	2 37	2 20	20 21	20 04
Northern Districts	3 35	3 32	1 08	1 03	37	36	89	85	5 69	5 56
The Province	23 78	23 72	8 98	8 82	2 26	2 20	4 44	4 01	39 46	38 75

Every district shows an increase in the total value of farm property compared with the preceding year, the average for the Province being \$39.46 per acre occupied, or 71 cents of an increase. This increase is distributed as follows: Farm land, 6 cents; buildings, 16 cents; implements, 6 cents, and live stock, 43 cents per acre.

VALUE PER ACRE CLEARED. A still better basis of comparison is afforded by the following table, as the values are here given per acre cleared or in use, by county groups and for the Province;

Farm property.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.			
									1898.	1897.	1883.	1883-98
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Buildings	17 32	14 59	13 32	18 08	19 17	14 71	12 66	11 26	16 17	16 03	15 00	16 39
Implements	4 49	3 83	3 80	4 22	4 27	4 00	3 46	3 84	4 08	3 99	4 13	4 28
Live stock	8 46	8 40	7 54	8 84	7 47	7 54	7 00	9 28	7 98	7 29	9 50	8 97
Total	30 27	26 82	24 66	31 14	30 91	26 25	23 12	24 38	28 23	27 31	23 63	29 64

Taking the figures for the Province, buildings have increased 14 cents, implements 9 cents and live stock 69 cents per acre cleared, compared with the figures of the previous year. Buildings reach the highest average value per acre in the Lake Ontario district, implements in the Lake Erie group, and live stock in the West Midland counties. The last named group also has the best figures for total values per acre.

RENTALS OF LEASED FARMS. The following table gives, by districts, the average value and rental of such leased farms as were reported in farmers' schedules returned to this Bureau in 1898 :

Leased farms	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern districts.	The Province.
Average value :	\$	\$	\$	\$	\$	\$	\$	\$	\$
Land	3,452	3,816	2,885	4,417	4,563	2,909	2,677	1,024	3,595
Buildings	1,354	1,395	1,168	1,729	1,786	1,343	1,012	542	1,417
Average rental	220	232	180	271	281	185	179	83	221
Rent per acre based on—	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Acres occupied. { 1898....	2 29	1 86	1 46	2 26	2 42	1 30	1 19	44	1 76
{ 1897....	2 14	1 62	1 50	2 19	2 34	1 40	1 23	44	1 73
{ 1886-98..	2 19	1 89	1 55	2 29	2 57	1 36	1 39	44	1 94
Acres cleared.. { 1898....	2 90	2 41	2 00	2 83	2 93	2 08	1 92	1 73	2 50
{ 1897....	2 75	2 32	2 02	2 71	2 80	2 07	1 84	1 84	2 44
{ 1886-98..	2 91	2 53	2 17	2 92	3 14	2 15	2 26	1 75	2 70
Per cent. ratio of rental to value { 1898....	4 58	4 43	4 44	4 41	4 43	4 35	4 85	5 30	4 47
{ 1897....	4 71	4 47	4 42	4 36	4 60	4 24	4 53	5 19	4 47
{ 1886-98..	4 26	4 30	4 37	4 29	4 49	3 99	4 60	5 05	4 34

The average rental of a farm is given as \$222, which is \$3 more than in 1897. The rental per acre occupied is \$1.76, or 3 cents more than in the previous year, while the rental per acre cleared is \$2.50, or an advance of 6 cents. The per cent. ratio of rental to the value of the farm is 4.47, which is exactly the same as that of 1897, and 14 cents more than the average for the thirteen years 1886-98.

VALUES OF LIVE STOCK.

VALUE OF HORSES. The value of each of the four classes of farm horses is shown in the table following, by county groups and for the Province, together with the total value for 1897 and 1898 ; also the value of all classes of cattle sold in the year :

Districts.	Working horses.	Breeding mares.	Colts.	Stallions.	Total on hand.	Total sold in year.
	\$	\$	\$	\$	\$	\$
Lake Erie	4,016,042	682,113	702,888	178,420	5,579,463	385,141
Lake Huron	3,092,410	760,876	590,146	97,770	4,541,202	435,957
Georgian Bay	2,478,869	506,602	381,788	65,053	3,432,312	237,246
West Midland	5,464,120	1,120,398	951,400	148,165	7,684,083	624,320
Lake Ontario	5,732,654	960,957	915,944	178,808	7,788,363	581,460
St. Lawrence and Ottawa	4,881,937	869,467	580,723	208,450	6,540,577	425,704
East Midland	1,748,487	281,940	245,079	31,625	2,307,131	144,854
Northern Districts	592,098	94,649	70,468	29,550	786,765	49,505
Totals..	{ 1898.. 28,036,617	{ 5,277,002	{ 4,438,436	{ 937,841	{ 38,659,896	{ 2,884,187
	{ 1897.. 26,559,966	{ 4,470,351	{ 4,271,851	{ 809,637	{ 36,111,805	{ 2,700,479

An increase has taken place in the value of each of the four classes of horses, the total for the Province being \$38,659,896, or \$2,548,091 more than in the preceding year. The Lake Ontario counties still lead in the total value of horses, although the West Midland district has the highest values for breeding mares and colts, and the St. Lawrence and Ottawa districts in stallions. Sales of horses during the year amounted to \$2,884,187, against \$2,700,479 in 1897. The West Midland group made the best record of sales.

VALUE OF CATTLE. The following table gives the value of the various classes of cattle, together with their total values in 1897 and 1898, and the value of cattle sold in 1898, by county groups and for the Province :

Districts	Working oxen.	Milch cows.	Store cattle.	Other cattle.	Total on hand.	Total sold in year.
	\$	\$	\$	\$	\$	\$
Lake Erie.....	14,950	3,033,918	1,119,228	1,372,519	5,540,615	1,641,213
Lake Huron.....	6,865	2,518,380	1,921,612	1,563,153	6,010,010	2,716,144
Georgian Bay.....	6,570	1,898,841	860,733	1,067,828	3,833,972	1,472,638
West Midland.....	5,524	5,572,009	2,589,607	2,530,662	10,697,802	5,028,410
Lake Ontario.....	3,770	4,475,397	1,053,189	1,652,021	7,184,377	2,587,205
St. Lawrence and Ottawa.	9,080	7,243,587	1,112,569	1,694,207	10,059,443	1,715,402
East Midland.....	6,125	2,093,316	364,246	642,081	3,105,768	745,931
Northern Districts.....	23,102	458,253	134,709	238,203	854,267	214,616
Totals..... { 1898.	75,986	27,293,701	9,155,893	10,760,674	47,286,254	16,121,559
{ 1897.	97,140	24,569,555	8,729,826	9,287,036	42,683,557	13,350,223

There is an increase in the value of every class of cattle except oxen, the total for the Province being \$47,286,254, or an increase of \$4,602,697 over the previous year. The West Midland and the St. Lawrence and Ottawa groups have the highest values. The total value of the cattle sold during the year was \$16,121,559, being an increase of \$2,771,336 compared with last year's figures. The West Midland counties far exceed any other group in the matter of sales.

VALUE OF SHEEP AND HOGS. The table following gives the values of all classes of sheep and hogs on hand and sold in 1898, by county groups and for the Province ; also the figures of the Province for 1897 :

Districts.	Sheep.				Hogs.			
	Over one year.	Under one year.	Total on hand.	Total sold in year.	Over one year.	Under one year.	Total on hand.	Total sold in year.
	\$	\$	\$	\$	\$	\$	\$	\$
Lake Erie.....	510,172	275,257	785,529	299,470	631,863	1,138,989	1,770,852	2,244,568
Lake Huron.....	583,303	355,084	938,391	360,502	306,165	579,523	885,688	1,228,439
Georgian Bay.....	510,484	276,834	787,348	278,481	282,770	478,903	761,673	1,010,455
West Midland.....	808,246	450,802	1,259,048	515,753	662,953	1,215,422	1,878,385	2,817,236
Lake Ontario.....	559,357	343,821	1,003,178	426,666	567,354	927,238	1,494,592	2,179,970
St. L. & Ottawa.....	686,153	408,403	1,094,556	383,135	615,468	678,844	1,295,312	1,525,962
East Midland.....	267,084	139,524	406,608	127,272	219,604	304,677	524,281	720,729
Northern Dis'ts.....	150,894	74,143	225,037	69,100	59,718	49,741	109,459	125,176
Totals { 1898.	4,175,693	2,324,002	6,499,695	2,460,379	3,346,895	5,373,347	8,720,242	11,852,535
{ 1897.	3,925,649	2,077,545	6,003,194	2,538,171	2,684,318	3,818,892	6,533,210	10,080,812

The total value of sheep on hand is \$6,499,695, or \$496,501 more than in the previous year, both classes having shared in the increase. The sales of sheep in the year, however, have fallen off by \$77,792. The immense increase in the value of both classes of hogs on hand has raised the total value to \$8,720,242, or \$2,187,032 more than in the preceding year. The sale of hogs in 1898 exceeded those of the preceding year by \$1,771,723.

VALUE OF POULTRY AND TOTAL LIVE STOCK The following table gives the value of poultry (by classes), and also the total value of live stock on hand and sold during the year, by county groups and for the Province :

Districts.	Poultry.					Total value of live stock on hand.	Total value of live stock sold in year.
	Turkeys.	Geese.	Other fowls.	T. tal on hand.	Total sold in year.		
	\$	\$	\$	\$	\$	\$	\$
Lake Erie.....	91,529	29,355	260,221	331,104	185,459	14,057,563	4,755,851
Lake Huron	71,389	26,674	174,129	272,192	111,065	12,647,443	4,852,107
Georgian Bay	50,651	26,658	133,651	210,890	77,931	9,026,165	3,076,751
West Midland	125,462	47,622	332,188	505,272	229,538	22,024,590	9,215,257
Lake Ontario.....	93,779	46,412	324,961	470,352	237,563	17,910,862	6,012,864
St. L and Ottawa.....	158,199	51,177	368,899	518,275	202,369	19,508,163	4,252,572
East Midland	42,568	18,489	114,249	175,306	70,001	6,519,094	1,808,787
Northern Districts.....	11,272	5,536	27,967	44,775	17,997	2,020,303	476,394
Totals { 1898.....	649,849	252,122	1,676,165	2,578,136	1,131,923	103,744,223	34,450,583
{ 189.....	573,100	229,543	1,515,395	2,318,038	1,083,914	93,649,804	29,753,599

The only comment necessary to make upon the foregoing table is that the totals of every column show a decided increase in 1898 over their respective figures for the preceding year.

VALUE OF LIVE STOCK PER HEAD. The values of the various classes of livestock per head on hand on July 1st, 1898, is shown in the following table :

Farm live stock.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.	
									1898	1897
Horses :	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Working horses	64	71	65	66	66	61	60	73	65	61
Breeding mares	66	73	67	70	70	63	59	72	68	64
Colts	47	46	43	46	48	38	39	42	44	41
Stallions	310	339	359	328	365	263	186	205	303	283
Cattle :										
Working oxen	39	45	45	41	47	40	43	45	43	42
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Milch cows.....	29 52	30 18	28 23	31 52	30 10	25 22	25 72	26 35	28 28	26 13
Store cattle	27 39	30 32	24 49	30 97	24 81	19 65	20 48	20 51	26 49	23 89
Other cattle	13 19	12 64	11 79	13 11	12 41	9 93	10 03	9 83	11 91	10 62
Sheep :										
Over one year	4 71	5 15	4 75	5 27	5 16	4 04	4 25	4 29	4 76	4 37
Under one year	2 90	3 13	2 87	3 16	3 01	2 66	2 57	2 51	2 91	2 62
Hogs :										
Over one year	12 28	12 49	12 27	13 41	14 04	11 91	11 34	11 76	12 63	11 40
Under one year	3 87	4 01	3 83	4 15	3 91	3 62	3 79	3 52	3 91	3 67
Poultry :	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
Turkeys	63	59	61	64	64	68	58	62	63	64
Geese	58	51	51	55	58	57	55	65	55	56
Other fowls	22	21	22	22	23	22	22	22	22	21

All classes of horses, cattle, sheep and swine are credited with an increase in value per head. Poultry do not make so good a showing, as both turkeys and geese have a slight decrease in value per head, although other fowls make a corresponding increase.

The following table gives the value per head of the various classes of farm stock sold in the years ending June 30th, 1897 and 1898 :

Farm live stock.		Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.	
										1898.	1897.
Horses :		\$ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.
Sold in year	{ 1898..	63 00	70 00	58 00	70 00	69 00	60 00	54 00	55 00	65 00	65 00
	{ 1897..	60 00	65 00	58 00	67 00	65 00	57 00	52 00	51 00	.....	62 00
Cattle :											
Sold or killed in year ..	{ 1898..	27 66	32 58	27 22	35 05	29 64	21 29	22 31	19 64	29 18	.....
	{ 1897..	24 57	30 20	23 99	30 52	28 20	20 64	20 44	19 47	.....	26 54
Sheep :											
Sold or killed in year ..	{ 1898..	3 72	3 81	3 61	4 17	4 00	3 15	3 30	3 25	3 70	.....
	{ 1897..	3 48	3 56	3 41	3 85	3 67	3 01	3 11	3 20	.....	3 46
Hogs :											
Sold or killed in year ..	{ 1898..	7 41	7 00	7 01	7 46	7 21	8 41	7 73	7 63	7 44	.....
	{ 1897..	7 28	6 62	6 97	7 03	6 87	8 73	7 14	7 65	.....	7 20
Poultry :		cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
Sold or killed in year ..	{ 1898..	34	37	36	39	37	37	38	35	37	.....
	{ 1897..	33	35	34	40	38	37	39	34	.....	37

There was a substantial increase in the value per head sold of horses, cattle, sheep and hogs, but the figures for poultry are the same in each year.

VALUES OF FARM CROPS.

MARKET PRICES. The following table is compiled from twenty eight fairly distributed market points, and the figures are taken for the period when each of the various articles of farm produce named in the table is marketed. The average prices for the seventeen years, 1882-98 are also given :

Markets.	Fall wheat, per bush.	Spring wheat, per bush.	Barley, per bush.	Oats, per bush.	Rye, per bush.	Peas, per bush.	Corn (in ear), per bush.	Buckwheat, per bush.	Beans, per bush.	Potatoes, per bush.	Hay, per ton.	Wool, per lb.
1898	cts. 69.4	cts. 69.2	cts. 38.0	cts. 25.8	cts. 43.5	cts. 52.2	cts. 20.1	cts. 38.2	cts. 70.0	cts. 44.1	\$ c. 6.22	cts. 16.6
1897	78.2	78.6	27.0	22.6	37.7	42.1	19.7	30.0	65.2	39.9	7.18	18.4
1896	71.0	70.6	31.6	20.0	36.6	44.0	19.6	30.5	68.4	26.2	9.68	18.4
1895	69.3	69.8	40.4	29.1	45.6	54.8	22.6	36.8	94.7	20.2	12.30	20.0
1894	55.0	55.5	40.5	30.8	44.2	53.6	26.1	39.2	110.4	35.4	7.56	16.9
1893	59.9	59.4	40.1	33.2	47.4	54.0	26.5	41.8	118.0	39.5	7.64	18.2
1892	70.7	67.8	41.3	30.8	55.8	59.0	26.3	42.2	98.8	50.4	8.20	18.2
1891	95.1	93.9	49.1	36.5	72.3	63.8	31.1	44.1	106.1	32.6	11.91	19.4
1890	94.2	91.3	50.2	41.1	52.7	60.3	30.5	43.0	128.5	44.3	7.95	20.5
1889	88.4	88.1	44.0	30.5	50.9	55.7	25.9	39.5	126.7	45.6	9.98	20.7
1888	102.4	99.3	60.1	40.5	60.2	65.4	29.3	49.3	113.7	31.7	16.71	20.4
1887	78.4	78.0	56.7	34.6	49.5	55.9	28.9	45.0	97.9	62.8	11.62	22.1
1886	73.6	72.5	51.3	32.0	52.2	52.6	27.6	33.7	83.7	44.9	9.69	19.1
1885	81.5	80.6	55.2	31.5	55.2	58.0	27.9	39.2	80.0	41.1	9.85	17.4
1884	80.5	81.4	53.6	33.1	59.7	64.4	45.0	40.0	118.0	40.0	9.56	17.8
1883	105.0	107.0	57.0	38.0	62.0	71.0	.....	.....	.....	62.0	9.02	16.9
1882	101.0	106.0	65.0	43.0	64.0	74.0	40.0	40.0	197.0	64.0	11.54	16.9
1882-98	80.8	83.5	49.2	31.7	52.2	57.2	28.4	38.7	99.4	40.5	9.26	18.6

Potatoes are the only item named in the foregoing table which exceeds its own average price for the seventeen years' period. On the other hand, every article excepting fall wheat, spring wheat, hay and wool has sold for a better figure than in 1897.

VALUE OF CROPS. The table following gives the value of each crop, based upon market prices, acreage and yield, for each of the five years 1894-98, together with the average for the seventeen years 1882-98.

Crops.	1898.	1897.	1896.	1895.	1894.	Average 1882-98.
	\$	\$	\$	\$	\$	\$
Fall wheat	17,460,147	18,758,656	10,705,693	9,809,610	9,081,658	14,901,317
Spring wheat	4,756,659	3,826,327	2,484,641	2,423,835	1,869,159	6,062,417
Barley	4,812,194	3,215,890	4,003,639	4,884,565	4,447,064	7,992,105
Oats	22,409,440	19,507,897	16,595,998	24,646,992	21,613,135	20,843,761
Rye	1,162,857	1,275,016	816,500	866,453	612,880	937,572
Peas	7,058,099	5,838,046	7,696,985	8,531,220	7,516,268	8,151,687
Corn { Husking	4,711,961	4,838,808	4,717,987	5,609,297	4,247,867	5,353,870
{ Silo	4,256,146	5,339,644	3,897,560	3,511,308	2,099,530	
Buckwheat	906,732	1,039,256	794,119	1,027,364	993,459	746,155
Beans	531,760	639,834	819,114	1,414,988	913,575	651,972
Potatoes	6,332,154	6,424,218	5,582,035	5,936,959	6,075,748	7,435,692
Mangel-wurzels.	1,756,605	1,448,271	1,347,952	1,276,920	922,570	888,085
Carrots	539,233	554,204	577,305	572,672	464,518	478,351
Turnips	6,472,788	6,829,715	6,981,484	6,349,670	6,169,449	5,166,829
Hay	27,362,172	27,366,699	21,879,123	22,753,942	27,028,512	30,654,832
Totals	110,528,947	106,952,471	88,900,135	99,655,895	94,055,392	110,264,645

Notwithstanding the fact that nine of the fourteen field crops, namely, fall wheat, rye, corn, buckwheat, beans, potatoes, carrots, turnips and hay, are lower in value than in 1897, the total of all crops shows an increase in value of \$3,576,476 compared with the preceding year, and of \$264,302 compared with the average for the seventeen years, the value of all field crops in 1898 being placed at \$110,528,947.

CROP VALUES BY COUNTY GROUPS. The table following gives the value of field crops by county groups and for the Province for each of the five years 1894-98, together with the average for the seventeen years 1882-98 :

Districts.	1898.	1897.	1896.	1895.	1894.	1882-98.
	\$	\$	\$	\$	\$	\$
Lake Erie	14,881,574	15,001,763	11,999,345	13,409,752	12,013,990	14,225,841
Lake Huron	12,846,590	12,858,133	9,989,032	10,713,179	10,128,930	11,954,690
Georgian Bay	10,177,007	9,920,460	8,080,330	9,186,194	8,836,148	9,849,955
West Midland	23,645,462	24,191,327	20,261,547	20,567,204	19,653,430	23,537,169
Lake Ontario	21,521,971	21,650,319	16,982,563	18,866,763	19,105,518	23,102,774
St. Lawrence and Ottawa	18,834,026	15,594,316	14,462,720	19,317,779	16,649,877	18,980,583
East Midland	6,897,224	6,073,736	5,456,850	6,015,770	6,693,352	7,106,026
Northern Districts	1,725,093	1,662,407	1,667,748	1,579,254	1,573,277	1,507,667
The Province ...	110,528,947	106,952,471	88,900,135	99,655,895	94,055,392	110,264,645

The Lake Erie, Lake Huron, West Midland and Lake Ontario districts fall below their respective values for the preceding year, but the other four groups more than make up for the deficiency. The Lake Ontario, St. Lawrence and Ottawa, and East Midland groups fail to reach their respective averages for the seventeen years period.

VALUE OF PRODUCE PER ACRE. The following table gives the value per acre raised of each of the staple field crop, by county groups and for the Province; also the totals for 1897, and the average for the seventeen years 1882-98. The average value of all crops per acre is also given:

Crops.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.		
									1898.	1897.	1882-98.
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Fall wheat.....	15 52	16 99	18 05	16 99	16 48	16 95	17 65	17 41	16 66	19 74	16 55
Spring wheat.....	10 35	11 78	11 04	10 73	11 57	14 14	11 89	12 43	12 22	11 84	12 78
Barley.....	11 29	11 80	10 53	11 59	10 64	10 46	10 13	9 33	10 97	7 19	12 68
Oats.....	9 29	10 06	8 97	10 24	9 28	9 24	8 16	7 37	9 43	8 02	10 94
Rye.....	6 38	8 15	7 10	8 06	6 70	7 44	6 84	8 35	7 04	6 79	8 43
Peas.....	7 42	9 37	8 24	8 12	7 72	9 09	6 98	7 84	8 15	6 51	11 19
Corn { husking.....	16 34	14 22	8 43	14 36	10 65	11 51	9 85	7 35	14 25	14 50	18 43
silo.....	16 16	22 14	21 86	22 92	19 99	25 63	20 89	23 56	22 41	25 55	
Buckwheat.....	6 17	7 12	6 20	7 37	5 41	6 07	6 13	5 97	6 68	6 85	7 55
Beans.....	11 86	11 50	13 37	11 80	9 58	12 06	11 07	12 11	11 76	12 65	17 31
Potatoes.....	41 45	36 33	41 44	36 54	35 02	38 51	31 36	38 71	37 26	37 94	46 59
Mangel-wurzels.....	34 82	37 06	33 96	39 71	35 97	34 23	31 68	22 23	36 65	35 17	35 42
Carrots.....	40 01	46 74	43 21	46 44	44 57	43 41	41 83	31 08	43 42	46 09	44 09
Turnips.....	34 78	46 15	44 76	46 05	38 73	43 79	38 71	34 54	42 70	45 73	42 55
Hay.....	10 99	10 94	10 65	11 99	12 12	10 58	11 12	8 87	11 15	11 69	12 86
All crops											
1898.....	12 84	12 90	12 26	13 72	12 40	11 76	11 11	10 18	12 51		
1897.....	13 11	13 09	12 18	14 04	12 51	10 09	10 07	10 29		12 29	
1882-98.....	14 32	14 19	13 81	15 33	14 00	13 07	12 35	13 18			14 00

Both yield and price go to make up the results given in the foregoing table. The value of all groups per acre is \$12 51, or twenty-two cents more than in 1897, though \$1 49 less than the average for the seventeen years. Fall wheat, corn, buckwheat, beans, potatoes, carrots, turnips and hay fail to reach their respective figures of the preceding year. The West Midland group has the highest value per acre, and the Northern districts the lowest.

PER CENT. RATIOS OF VALUES PER ACRE. The following table compares the values of the various crops by means of per cent. ratios, with their respective averages for the seventeen years 1882-98, by county groups and for the Province:

Districts.	Fall wheat.	Spring wheat.	Barley.	Oats.	Rye.	Peas.	Corn.	Buckwheat.	Beans.	Potatoes.	Mangel-wurzels.	Carrots.	Turnips.	Hay.	All field crops.
Lake Erie	101	87	95	84	83	75	88	87	71	101	105	102	97	81	94
Lake Huron.....	102	100	91	99	95	77	97	98	70	80	101	103	109	85	91
Georgian Bay.....	103	89	85	85	73	70	92	89	77	84	100	106	104	88	89
West Midland.....	99	87	81	86	98	79	93	102	67	79	106	99	105	84	89
Lake Ontario.....	99	88	83	82	86	72	83	73	53	81	101	97	89	94	89
St. Lawrence and Ottawa.....	107	105	87	90	77	82	100	75	55	78	109	106	114	85	90
East Midland.....	109	100	85	84	82	67	98	84	65	65	96	98	99	101	90
Northern Districts.....	106	84	89	79	82	65	117	73	70	67	90	87	104	79	77
The Province.....	101	96	87	86	84	73	93	80	68	80	103	98	100	87	89

Fall wheat and mangel wurzels are the only crops going over 100 in the figures for the Province, while turnips exactly reach that figure. None of the districts reach 100 for all crops, the Lake Huron group coming nearest to it with 91.

LABOR AND WAGES

The tenor of the August returns was thus expressed in the bulletin then published: "The supply of farm labor as a rule has been fully adequate to the demand, the complaints of scarcity in a few localities being inevitable in any condition of the labor market when the temporary nature of harvest work is considered. The tendency to dispense with labor outside of the farmers' family by the increased use of machinery continues, and as less help is needed on the farm the supply adjusts itself to the diminishing requirements. There is a very wide range of difference noticeable in the wages paid for farm labor. Through the greater part of the Province the wages of harvest hands run from 75 cents to \$1.25 or \$1.50 per day, with board. Monthly wages vary from \$12 to \$25 with board, the larger amounts being where engagements are limited to a month or two in the harvest season. In some eastern localities men are obtainable by the day for from 50 to 75 cents and board, or \$1 without. Taking the Province throughout, \$1 or \$1.25, with board, would probably be a fair average for harvest hands engaged by the day, and \$15 per month for engagements for the season."

The November bulletin contained the following: "Farm labor has been fully equal to the demand during the greater part of the season, but in a few neighborhoods there was a scarcity during the harvest season. The demand is decreasing owing to the more universal employment of agricultural machinery, which enables many farmers to dispense with help outside of their own families. The great majority of correspondents see no reason to anticipate any change in the rate of wages, but most of those who take a different view look for an increase rather than a fall, on the ground that times are improving, and that many young men have gone to the North-west or found employment in railway or canal construction. The complaint that female domestic labor is scarce, and in some cases practically unobtainable, is well nigh universal—the cause assigned being the preference of country-bred girls for employment in the cities and towns, where the wages are higher and the work not so hard. Various remedies are suggested, prominent among these being the encouragement of immigration, but nearly all who touch on this phase of the subject oppose the importation of juvenile street waifs."

The rates of wages paid farm laborers is given in the following table by the year and by the month, with and without board, by county groups and for the Province, in 1897 and 1898, together with the average for the seventeen years 1882-98; also the monthly wages of domestic servants on the farm:

Districts.	Per year.						Per month in working season.									Domestics per month with board.	
	With board.			Without board.			With board			Without board.							
	1898.	1897.	1882-98.	1898.	1897.	1882-98.	1898.	1897.	1882-98.	1898.	1897.	1882-98.	1898.	1897.			
	\$	\$	\$	\$	\$	\$	\$ c.	\$	c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	
Lake Erie	145	146	155	232	234	247	15.51	14.60	16.62	24.60	24.59	25.65	6.05	6.35			
Lake Huron	146	116	158	233	224	252	15.09	13.92	16.97	24.90	24.29	26.63	5.96	5.87			
Georgian Bay	148	141	155	237	248	258	15.10	13.88	16.80	25.48	24.37	26.52	5.76	5.64			
West Midland	117	143	157	249	239	248	15.22	13.89	16.63	25.66	24.10	25.95	6.33	6.16			
Lake Ontario.....	151	147	149	252	244	252	15.39	14.47	16.78	25.79	24.69	26.03	6.30	6.12			
St. Lawrence and Ottawa	153	139	157	258	233	249	15.11	14.32	16.96	25.43	23.45	25.96	5.81	5.78			
East Midland	144	139	159	241	234	253	14.80	13.89	16.73	24.89	24.59	26.16	5.62	5.57			
Northern Districts...	163	159	172	279	237	271	16.97	16.26	18.87	26.46	26.23	28.60	6.54	5.91			
The Province...	148	144	157	246	236	251	15.31	14.29	16.82	25.44	24.47	26.24	6.09	5.97			

The average yearly rate of wages, with board, is \$148, or \$4 more than in the preceding year, although there has been no change in the Lake Huron district, and a falling off of \$1

in the Lake Erie group. Wages by the year, without board, have risen to \$246, or \$10 more than in the preceding year, but the Lake Erie and Georgian Bay counties fail to share in the increase. Monthly wages, with board, average \$15.31, which is \$1.02 better than in the year before, and monthly wages without board average \$25.44, or 97 cents more than in 1897. In every instance the total for the Province in 1898 is less than the average for the seventeen years. Domestic servants average \$6.09, or 12 cents more than in the year preceding. This year this class of workers received the highest average wages in the Northern Districts.

REMARKS OF CORRESPONDENTS.

FROM THE AUGUST RETURNS.

Colchester N., Essex : The scarcity has arisen from so many being employed in the cultivation of tobacco in adjoining townships.

Gosfield N., Essex : No man need go hungry for the want of work in this township.

Raleigh, Kent : One dollar a day with board for good man ; poor ones for what they could get.

Bertie, Welland : Starvation wages ; farmers are too poor to hire.

Dawn, Lambton : Farm laborers are very scarce. Farmers do not pretend to hire help except a few days in harvest ; even then some farmers combine with a neighbor, get binders and mowers in partnership and work them turn about in each place.

Moore, Lambton : Improved machinery supplies the want for harvest hands.

Arran, Bruce : Wages higher than usual for the last few years.

Artemesia, Grey : There are a great number of young men and girls that go to the city and on farms in other sections in southern Ontario or the States from here. Not much hiring done here.

Oro, Simcoe : The labor is mostly hired for six to eight months—from March or April.

London, Middlesex : Good farm hands always scarce. Too many useless tools.

Westminster, Middlesex : There is quite a demand for good men, and they are not plentiful.

Blandford, Oxford : There is sufficient where hands are generally well used ; but some farmers have an ill name and find trouble enough.

Dumfries S., Brant : Sufficient for summer work but scarce at harvest. Cause, not enough yearly engagements ; men seek employment of more permanency.

Saltfleet, Wentworth : Wages are a little lower than last year.

Nassagaweya, Halton : Owing to so much machinery being used few men are required.

Scott, Ontario : Labor is dearer, wages higher.

Percy, Northumberland : Plenty of men ; female servants scarce.

Ameliasburg, Prince Edward : As nearly all farmers have good binders to cut and harvest their crops, they do not need so much help.

Lancaster, Glengarry : Improved machinery has made great changes here.

Cumberland, Russell : Scarce enough on account of railroad work.

Osgoode, Carleton : Not so many laborers and not so many looking for them.

FROM THE NOVEMBER RETURNS.

Mersa, Essex : The rate of wages has been higher this year owing to the tobacco industry, but will fall to the old level, as there will not be as much tobacco planted next year.

Harwich, Kent : A good many laborers have gone to the N.W.T. and Manitoba.

Seneca, Haldimand : Our improved machinery lessens the demand for farm labor.

Dawn, Lambton : Almost impossible to get a farm laborer when you want a man. Even boys raised on a farm leave it, if they get any other opening not near as good.

Moore, Lambton : The use of machinery is superseding hand labor greatly in farming operations.

Ashfield, Huron : The rate of wages is likely to rise owing to better prices of farm products, and the removal of many laboring men to the United States and Western regions of Canada.

Howick, Huron : I think immigration will regulate any deficiency caused by our laborers advancing to independence, which is going on steadily.

Culross, Bruce : Wages high and likely to continue so owing to emigration to Manitoba and elsewhere.

Keppel, Grey : Machinery is taking the place of hired help.

Sunnidale, Simcoe: Many of the farm laborers we have now are boys from the "Homes" brought from the Old Country city slums. We would suggest that they be left, a good many of them, in their native land.

Caradoc, Middlesex: Wages will rise on account of such mammoth railway building, surveying and prospecting in general in the far West.

Nissouri W., Middlesex: Wages increasing on account of good prospects; farmers feel more confident in paying good wages.

Oakland, Brant: Men flock to the cities to work in the machine shops, and farmers buy the machines to take the place of the men.

Elma, Perth: The wages will likely drop somewhat now as winter is coming, and quite a number are returning from distant districts.

Erin, Wellington: Wages will rise somewhat, as times are improving, which gives the farmers a more hopeful outlook. They will make improvements which will necessitate more help.

Waterloo, Waterloo: Plenty of laborers. In fact the many machines take the place of our laborers, and the laborers will have less work from year to year.

Woolwich, Waterloo: So many farm laborers are going to Manitoba that I should not be surprised if they would get scarce. I think the only plan to keep laborers here is to hire by the year and have up-to-date labor-saving machinery.

Amaranth, Dufferin: Very scarce indeed—all gone to the Northwest or Klondyke. Wages will be about the same; they are as high as the employers can pay.

Grantham, Lincoln: Wages are likely to fall unless the price of produce goes higher.

Grimsby, S., Lincoln: The supply seems to be increasing in proportion to the demand. Machinery has to a great extent done away with hiring.

Glanford, Wentworth: Wages will likely remain about as they are. The tendency is rather downward.

Esquering, Halton: The rate of wages is more likely to rise than fall. The gold fields and the northwest are thinning the population.

Nassagaweya, Halton: With the many labor-saving appliances now in the hands of the farmer he can get along with less help and will not pay higher wages.

Scarborough, York: No more "Home" boys. We want good farm hands from agricultural districts.

Vaughan, York: Laborers are becoming scarce and times are improving—consequently there is more demand for labor.

Mara, Ontario: It will likely rise in this locality, for the young men are in the habit of going to the lumber districts, and lumbering is now more brisk than usual.

Hamilton, Northumberland: I would have the Government prohibit the bringing in of "scums" from British cities and having them scattered all over the Province to increase the society of law-breakers, murderers and irresponsible transgressors.

Percy, Northumberland: I think the farmers should strive to furnish work for farm laborers through the winter—as this will keep them from going to other work in the winter.

Ameliasburg, Prince Edward: Nearly all are of the opinion that immigrants are generally poor help, and many of them very saucy and hard to govern.

Athol, Prince Edward: Wages will rise. Laborers will die out of poverty, take to the chase, stealing, or some other means of living if products of labor are not more fairly divided.

Camden, Addington: Keep out of the country the pauper waifs they are spending so much money to bring in. Encourage our native population to stop at home by giving free land and assistance to start with.

Lancaster, Glengarry: Farm laborers are easily obtained at a reasonable rate.

March, Carleton: Wages are not likely to fall. A big demand on railroads and mines.

McNab, Renfrew: Encourage good, honest immigrants, but prohibit the waifs and scum of cities being brought in.

Harvey, Peterborough: I do not think the wages will be higher, as help is plenty and the farmers are using agricultural machinery, which saves much hiring.

Monmouth, Haliburton: The majority of our young men are more for shanties and drives than farms.

Medora and Wood, Muskoka: On account of lumbering, wages are high.

Nipissing, Nipissing: I felt deeply grieved at reading of the severe reproaches cast on our Dr. Barnardo's boys. I have had eight of these orphan lads, and on the whole they were not one whit worse than other young folks. Three have grown up to manhood's estate and are splendid specimens of manhood. Others have gone west and are in creditable service. I have a lad over two years with me now, the best worker and the brightest lad that could be taken into any home.

DOMESTIC SERVANTS.

Malden, Essex: There are enough girls, but they are too proud to work.

Harwich, Kent: There is no likelihood of domestics becoming more plentiful. So many are taking positions as book-keepers, secretaries, teachers, etc.

Malahide, Elgin: If female servants had a proper training before they were distributed among the different families they would prove a blessing to farmers' wives.

Yarmouth, Elgin : There should be some method of getting young women from the old country. The girls here will not hire on the farm.

Walsingham N., Norfolk : Domestic servants should be used more as members of the family.

Dunn, Haldimand : Domestic servants are scarcer than ever. They go mostly to the towns and cities.

Moulton, Haldimand : I think servants would be more plentiful if they were used better.

Dawn, Lambton : Domestic servants are impossible to get. All flock to the large towns.

Ashfield, Huron : Higher wages are necessary to induce hired help, both male and female, to remain in this country. Steady employment is also needed. Girls betake themselves to American cities where both are procurable. Many learn trades or work in factories. A dislike of farm work fills their minds.

Howick, Huron : Domestic servants scarce and wages high. Too many country girls going to the towns and cities. Don't think we require any importation of farm laborers—especially no gutter children from the cities of England. They are an unmitigated curse.

Stephen, Huron : You would insult the average young woman who works out if you called her a domestic or hired girl, she must be called a lady.

Arran, Bruce : You might travel a whole day and not get one to hire on a farm. There are plenty of girls, but they keep clear of the farm.

Glenelg, Grey : All the spare girls go to the city or town, where they get good wages, and the work is perhaps more congenial to their ideas of labor.

Sarawak, Grey : There are so many girls looking for work in offices and factories that wages for domestic servants are likely to go up.

Gwillimbury W., Simcoe : Domestics seem to prefer the needle at starvation wages to farm work.

Williams E., Middlesex : A luxury we cannot afford. They all go to Detroit and get wages there which the direst necessity compels us to give, but which they do not and cannot earn on a farm.

Zorra E., Oxford : Domestic servants are scarce, as daughters do not care to work from home, and many are above work even at home.

Eramosa, Wellington : Girls for housework are very hard to find. The only source of supply that I see is immigration, as the majority of our young Canadians are not willing to work out.

Waterloo, Waterloo : As long as women take the places that men formerly occupied in offices, etc., we have little hope to be better supplied.

Garafraxa E., Dufferin : They seem to get scarcer every year and wages go up. A good girl gets about what she asks.

Amaranth, Dufferin : The quality of what we have is not over satisfactory, and we don't want to try the experiment of a further immigration.

Clinton, Lincoln : Domestic servants are of a poor quality, and hard to get at that, and only remain for a little while.

Grimsby S., Lincoln : This township can produce all the farm laborers and domestic servants required for some length of time yet.

Beverly, Wentworth : Domestic servants are about a thing of the past, being hard to get. We do not want an imported lot.

Saltfleet, Wentworth : I think the future supply of domestic servants of a good type can only be secured by making the avocation appear to the servants as respectable as any other calling they might engage in.

Nassagaweya, Halton : Domestic servants are hard to procure. Idle girls are very plentiful, but they appear to think it a degradation to work on a farm.

Toronto Gore, Peel : It is not so hard to get a hired girl as it used to be.

Gwillimbury N., York : Female help is rather scarce and in demand, more especially during the summer season.

York, York : Domestic servants that are of any use are scarce, as the best ones generally flock to the cities. A number of the better class of servants could find steady employment.

Pickering, Ontario : Domestic servants are very scarce. They seem to think that there is no place like the cities and towns. I suppose they get better wages and easier work.

Cartwright, Durham : Domestic servants are plentiful, and quite equal to the requirements.

Clarke, Durham : A good mistress generally gets a servant.

Percy, Northumberland : There seems to be plenty of domestic servants to fill the demand.

Ameliasburg, Prince Edward : Good domestic servants are hard to get.

Kingston, Frontenac : Good domestics are difficult to obtain. Girls would rather go to factory work, as clerks in stores, in business offices, banks, loan offices, insurance offices, post offices, telegraph offices, and other openings too numerous to relate here.

Cumberland, Russell : Wages are not high enough to draw domestic servants to the farm. Girls like to go to the cities for a good time and to see life.

March, Carleton : Domestic servants are scarce. They prefer city life.

Drummond, Lanark : Domestic servants are scarce, except those "Home" specimens, which should not be permitted to mix with our people.

Glamorgan, Haliburton : Domestic servants are eagerly sought for, and industrious ones with good habits have no difficulty in finding good situations.

STATISTICS OF

VALUES OF FARM PROPERTY AND PRODUCTS

FARM VALUES—LAND, BUILDINGS AND IMPLEMENTS.

TABLE I. Showing by County Municipalities and groups of Counties the value of Farm Land, Building and Implements in Ontario for the years 1897 and 1898.

Counties.	Farm Land.		Farm Buildings.		Farm Implements.	
	1898.	1897.	1898.	1897.	1898.	1897.
	\$	\$	\$	\$	\$	\$
Essex	15,419,211	15,527,353	4,841,018	4,751,295	1,366,001	1,343,58
Kent	21,217,933	21,254,892	6,444,690	6,146,413	1,804,157	1,719,4
Elgin	15,136,914	15,323,701	5,707,007	5,538,286	1,447,770	1,451,00
Norfolk	10,701,164	10,339,636	4,578,635	4,447,569	1,130,776	1,090,2
Haldimand	8,050,091	8,127,488	3,611,895	3,667,180	950,117	916,5
Welland	8,054,805	8,098,531	3,616,625	3,614,461	768,047	764,6
Totals	78,880,118	78,671,601	28,802,870	28,165,204	7,466,868	7,285,58
Lambton	17,466,905	17,227,365	5,666,529	5,441,664	1,582,821	1,501,6
Huron	26,889,852	26,881,467	9,501,792	9,333,212	2,387,458	2,331,2
Bruce	19,510,671	19,147,362	6,792,371	6,745,513	1,795,823	1,750,1
Totals	63,867,428	63,256,194	21,960,692	21,520,389	5,766,102	5,583,0
Grey	20,405,764	20,359,64	7,931,075	7,820,700	2,329,100	2,300,0
Simcoe	22,695,332	22,353,51	8,019,688	7,909,813	2,223,243	2,113,9
Totals	43,101,096	42,713,156	15,950,763	15,730,513	4,552,343	4,414,0
Middlesex	28,597,920	28,503,756	10,689,318	10,562,463	2,495,442	2,449,4
Oxford	19,708,705	19,761,117	7,525,799	7,509,293	1,640,923	1,564,7
Brant	9,140,817	9,217,692	3,904,662	3,865,118	775,971	721,6
Perth	19,733,964	19,739,48	7,456,365	7,299,230	1,853,900	1,770,2
Wellington	19,153,834	19,141,667	7,501,984	7,547,385	1,781,567	1,757,8
Waterloo	11,498,227	11,614,324	5,158,731	5,101,045	1,179,449	1,166,5
Dufferin	8,421,417	8,206,289	2,765,398	2,735,092	772,405	747,4
Totals	116,254,884	116,184,328	45,002,257	44,619,626	10,499,657	10,177,8
Lincoln	9,804,438	9,674,100	4,246,089	4,274,062	931,892	912,2
Wentworth	12,882,788	13,063,526	5,001,912	5,093,973	1,150,269	1,111,5
Halton	9,056,934	9,282,956	3,902,401	3,789,798	772,015	740,9
Peel	10,973,867	11,168,749	4,584,809	4,608,167	938,205	958,5
York	25,409,011	25,123,653	9,201,002	8,818,387	2,016,115	1,911,0
Ontario	15,776,880	16,084,761	6,196,367	6,154,696	1,402,200	1,372,4
Durham	12,347,550	12,281,196	4,532,396	4,402,142	995,386	989,0
Northumberland	12,374,874	12,637,573	5,169,923	5,149,814	1,229,902	1,251,4
Prince Edward	6,720,492	6,441,457	3,214,182	2,992,877	791,512	711,4
Totals	115,346,834	115,757,971	46,049,081	45,283,916	10,277,496	9,958,7
Lennox and Addington	7,866,133	7,637,889	3,234,504	3,063,582	835,915	751,0
Frontenac	8,197,957	8,161,111	3,146,010	3,086,733	854,722	842,8
Leeds	10,474,773	10,262,906	4,229,139	4,038,323	1,006,338	991,7
Grenville	6,343,805	6,336,642	2,747,352	2,611,069	690,056	640,0
Dundas	6,740,846	6,726,905	2,808,992	2,704,617	745,753	708,6
Stormont	5,585,835	5,614,336	2,547,167	2,423,233	613,065	578,9
Glengarry	6,532,444	6,251,266	3,232,512	2,950,063	844,699	764,2
Prescott	6,204,371	6,170,512	2,524,350	2,512,887	745,507	692,5
Russell	4,554,194	4,370,895	1,270,764	1,265,629	472,332	447,3
Carleton	15,553,152	15,485,402	5,095,375	5,074,015	1,533,571	1,533,1
Renfrew	9,490,549	9,022,602	3,655,356	3,493,879	1,131,937	1,101,5
Lanark	9,535,016	9,190,622	3,533,633	3,477,574	874,548	840,3
Totals	97,081,275	96,231,088	38,035,154	36,706,694	10,352,443	9,892,5
Victoria	10,077,308	10,420,503	3,311,247	3,287,493	896,439	907,3
Peterborough	9,551,575	9,440,599	3,093,170	3,013,777	785,893	760,0
Haliburton	963,268	933,502	300,433	283,345	107,793	99,1
Hastings	13,524,019	12,998,590	5,188,182	5,154,654	1,435,222	1,415,4
Totals	34,116,170	33,793,194	11,803,032	11,739,269	3,225,347	3,181,9
Muskoka	1,969,755	1,957,538	772,519	726,327	256,249	250,9
Parry Sound	1,801,488	1,763,913	618,618	596,484	211,435	210,4
Nipissing	927,306	899,569	267,291	254,607	86,882	79,4
Manitoulin	937,238	942,799	319,927	305,646	122,183	118,0
Algoma	1,962,977	1,883,201	472,192	441,484	160,227	145,4
Totals	7,598,764	7,447,020	2,450,547	2,324,548	836,976	805,3
* The Province	556,246,569	554,054,552	210,054,396	206,090,159	52,977,232	51,299,0

FARM VALUES--LIVE STOCK AND TOTAL PROPERTY--RENTALS.

TABLE II. Showing by County Municipalities and groups of Counties the values of Farm Live Stock and total Farm Property in Ontario for the years 1897 and 1898; also the rent per acre of leased farms as reported in 1898, with the average derived for the thirteen years, 1886-98.

Counties.	Farm Live Stock.		Total Farm Property.		Rent per acre on Land.			
					Occupied.		Cleared.	
	1898.	1897.	1898.	1897.	1898.	1886-98.	1898.	1886-98.
	\$	\$	\$	\$	\$ c	\$ c.	\$ c.	\$ c.
sex	2,549,779	2,237,216	24,179,009	23,859,456	2 41	2 29	3 15	3 24
ent	3,619,433	3,047,980	33,086,213	32,168,769	2 87	2 63	3 59	3 55
gin	3,159,004	2,648,602	25,750,695	24,961,654	2 28	2 27	2 96	3 04
orfolk	1,883,783	1,639,620	18,294,358	17,517,050	2 11	1 94	2 67	2 58
aldham	1,609,685	1,369,144	14,221,788	14,080,339	1 67	1 76	2 06	2 23
elland	1,235,879	1,144,242	13,675,356	13,621,896	1 94	2 03	2 37	2 49
Totals	14,057,563	12,086,804	129,207,419	126,209,164	2 29	2 19	2 90	2 91
ambton	3,350,202	3,004,903	28,066,457	27,175,601	1 80	1 84	2 48	2 70
uron	5,266,870	4,811,862	44,045,972	43,357,799	2 21	2 17	2 64	2 72
ruce	4,030,411	3,611,824	32,129,276	31,784,833	1 54	1 62	2 10	2 22
Totals	12,647,483	11,428,589	104,241,705	101,788,233	1 86	1 89	2 41	2 53
rey	4,643,983	4,226,442	35,309,922	34,706,817	1 29	1 29	1 84	1 88
mcroe	4,382,182	4,022,918	37,320,445	36,400,241	1 85	1 92	2 32	2 51
Totals	9,026,165	8,249,360	72,630,367	71,107,058	1 46	1 55	2 00	2 17
iddlesex	5,720,176	4,945,085	47,502,856	46,460,768	2 42	2 49	2 99	3 19
xford	3,688,245	3,285,820	32,563,672	32,120,993	2 50	2 66	3 15	3 38
rant	1,430,367	1,235,370	15,251,817	15,039,796	2 73	2 72	3 19	3 31
erth	3,956,173	3,423,355	33,000,402	32,232,289	2 87	2 34	2 84	2 91
Wellington	3,824,711	3,453,674	32,262,096	31,900,562	1 90	1 97	2 47	2 54
Waterloo	1,854,601	1,656,927	19,691,008	19,538,816	2 34	2 22	2 81	2 76
ufferin	1,550,317	1,390,119	13,509,537	13,078,958	1 68	1 58	2 26	2 19
Totals	22,024,590	19,390,350	193,781,388	190,372,182	2 26	2 29	2 83	2 93
lincoln	1,168,718	1,101,636	16,151,137	15,962,067	2 51	2 37	3 01	2 87
Ventworth	1,787,736	1,606,056	20,822,705	20,875,085	2 83	2 93	3 39	3 63
alton	1,370,401	1,260,967	15,101,751	15,074,695	2 45	2 37	3 08	3 05
eel	1,827,768	1,636,193	18,374,649	18,371,670	2 56	2 66	2 96	3 16
ork	3,427,204	3,155,915	40,053,332	39,008,969	3 01	3 04	3 60	3 66
ntario	2,937,399	2,631,699	26,312,846	26,303,609	2 24	2 61	2 70	3 22
urham	1,986,614	1,832,379	19,861,946	19,504,797	2 20	2 56	2 53	3 08
orthumberland	2,308,596	2,160,153	21,083,295	21,198,992	1 83	2 00	2 27	2 48
Prince Edward	1,126,426	1,053,247	11,852,612	11,199,018	2 36	2 06	2 98	2 52
Totals	17,940,862	16,498,245	189,614,273	187,498,902	2 42	2 57	2 93	3 14
lennox & Addington	1,460,684	1,246,057	13,397,236	12,703,625	1 35	1 53	1 92	2 21
rontenac	1,680,930	1,517,080	13,883,619	13,607,819	95	1 21	1 74	1 84
eeda	1,927,615	1,784,959	17,637,865	17,077,912	1 67	1 71	2 53	2 49
renville	1,201,638	1,113,379	10,982,851	10,701,095	1 65	1 71	2 12	2 49
undas	1,408,901	1,261,082	11,704,492	11,401,226	1 82	1 74	2 61	2 69
stormont	1,183,256	1,044,375	9,929,323	9,660,999	1 50	1 48	2 40	2 29
langarry	1,642,691	1,461,082	12,252,546	11,426,637	1 59	1 43	2 37	2 29
rescott	1,248,793	1,194,195	10,723,021	10,570,130	1 49	1 59	2 17	2 31
ussell	894,779	793,903	7,194,069	6,877,786	1 46	1 34	2 29	2 29
arleton	2,576,625	2,593,124	24,758,723	25,685,720	1 68	1 75	2 31	2 50
Renfrew	2,243,998	2,104,756	16,531,840	15,722,772	76	85	1 65	1 72
anark	2,038,253	1,955,579	15,981,450	15,464,166	1 01	88	1 50	1 42
Totals	19,508,163	18,069,571	164,977,035	160,899,887	1 30	1 36	2 08	2 15
Victoria	1,876,967	1,655,336	16,161,961	16,270,748	1 50	1 63	2 10	2 47
Peterborough	1,520,233	1,433,390	14,860,871	14,647,774	1 01	1 24	1 73	2 01
Haliburton	290,229	263,410	1,661,723	1,579,399	46	36	1 37	1 36
Hastings	2,831,665	2,655,923	22,979,088	22,224,615	1 26	1 54	1 99	2 33
Totals	6,519,094	6,008,109	55,663,643	54,722,536	1 19	1 39	1 92	2 26
Muskoka	574,821	543,983	3,573,344	3,478,785	40	36	1 99	1 68
Parry Sound	535,103	498,321	3,166,644	3,069,129	32	40	1 47	1 72
Nipissing	186,849	188,310	1,468,328	1,421,951	40	49	2 54	2 56
Manitoulin	355,502	352,185	1,734,850	1,718,638	61	67	(1 49)	1 97
Algoma	368,028	335,977	2,963,424	2,807,148	53	67	(1 80)	1 97
Totals	2,020,303	1,918,776	12,906,590	12,495,651	44	44	1 73	1 75
The Province	103,744,223	93,649,804	923,022,420	905,093,613	1 76	1 94	2 50	2 70

FARM VALUES—AVERAGE PER ACRE.

TABLE III. Showing by County Municipalities and groups of Counties the average value per acre occupied of Farm Land, Buildings, Implements and Live Stock in Ontario for the years 1897 and 1898.

Counties.	Land.		Buildings.		Implements.		Live Stock.		Total property.	
	1898.	1897.	1898.	1897.	1898.	1897.	1898.	1897.	1898.	1897.
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Essex	35 85	36 03	11 26	11 02	3 17	3 12	5 93	5 19	56 21	55 36
Kent	37 39	37 54	11 35	10 86	3 18	3 04	6 38	5 38	58 30	56 82
Elgin	35 46	35 00	13 11	12 65	3 32	3 31	7 27	6 05	59 16	57 01
Norfolk	26 89	25 91	11 51	11 14	2 24	2 73	4 73	4 11	45 97	43 89
Haldimand	28 73	28 94	12 89	13 06	3 39	3 26	5 74	4 88	50 75	50 14
Welland	35 47	35 63	15 92	15 90	3 38	3 36	5 44	5 03	60 21	59 92
Group	33 74	33 59	12 32	12 02	3 19	3 11	6 01	5 16	55 26	53 88
Lambton	26 39	26 11	8 56	8 25	2 39	2 27	5 06	4 55	42 40	41 18
Huron	33 69	33 58	11 90	11 66	2 99	2 91	6 60	6 01	55 18	54 16
Bruce	22 51	22 03	7 84	7 76	2 07	2 01	4 65	4 16	37 07	35 96
Group	27 45	27 15	9 44	9 24	2 48	2 40	5 43	4 90	44 80	43 69
Grey	19 24	19 15	7 48	7 36	2 19	2 16	4 38	3 98	33 29	32 65
Simcoe	23 59	23 18	8 34	8 20	2 31	2 19	4 56	4 17	38 80	37 74
Group	21 31	21 07	7 89	7 76	2 25	2 17	4 46	4 07	35 91	35 07
Middlesex	37 75	37 71	14 11	13 97	3 30	3 24	7 55	6 54	62 71	61 46
Oxford	41 71	41 86	15 93	15 91	3 47	3 31	7 81	6 96	68 92	68 04
Brant	42 37	42 64	18 10	17 88	3 60	3 34	6 63	5 71	70 70	69 57
Perth	38 06	38 09	14 38	14 08	3 58	3 42	7 63	6 60	63 65	62 19
Wellington	30 52	30 50	11 95	12 03	2 84	2 80	6 09	5 50	51 40	50 83
Waterloo	37 50	37 94	16 83	16 66	3 85	3 81	6 05	5 41	64 23	63 82
Dufferin	23 65	23 06	7 76	7 69	2 17	2 10	4 35	3 91	37 93	36 76
Group	35 72	35 73	13 83	13 72	3 22	3 13	6 77	5 96	59 54	58 54
Lincoln	51 23	50 53	22 19	22 32	4 87	4 77	6 11	5 75	84 40	83 37
Wentworth	47 25	47 96	18 35	18 70	4 22	4 08	6 56	5 89	76 38	76 63
Halton	40 28	41 37	17 36	16 89	3 43	3 30	6 09	5 62	67 16	67 18
Peel	38 07	38 70	15 91	15 97	3 43	3 32	6 34	5 67	63 75	63 66
York	47 36	46 90	17 15	16 46	3 76	3 57	6 39	5 89	74 66	72 82
Ontario	31 65	32 27	12 43	12 35	2 81	2 75	5 89	5 40	52 78	52 77
Durham	33 26	33 13	12 21	11 87	2 68	2 67	5 35	4 94	53 50	52 61
Northumberland	28 44	29 05	11 88	11 84	2 83	2 88	5 30	4 97	48 45	48 74
Prince Edward	28 91	27 79	13 82	12 91	3 40	3 07	4 85	4 54	50 98	48 31
Group	37 81	37 97	15 09	14 86	3 37	3 27	5 88	5 41	62 15	61 51
Lennox and Addington	17 90	17 34	7 36	6 97	1 90	1 70	3 33	2 83	30 49	28 84
Frontenac	11 92	11 83	4 58	4 47	1 25	1 22	2 44	2 20	20 19	19 72
Leeds	22 27	21 88	8 99	8 61	2 14	2 12	4 10	3 81	37 50	36 42
Grenville	23 40	23 37	10 14	9 63	2 55	2 36	4 43	4 11	40 52	39 47
Dundas	28 47	28 30	11 86	11 38	3 15	2 98	5 95	5 31	49 43	47 97
Stormont	22 48	22 62	10 25	9 77	2 47	2 33	4 76	4 21	39 96	38 93
Glengarry	22 52	21 74	11 14	10 26	2 91	2 65	5 66	5 08	42 23	38 73
Prescott	21 58	21 57	8 77	8 78	2 59	2 42	4 35	4 18	37 29	36 95
Russell	18 16	17 41	5 06	5 04	1 88	1 78	3 57	3 16	28 67	27 39
Carleton	27 50	29 23	9 01	9 00	2 71	2 72	4 56	4 60	43 78	45 55
Renfrew	9 94	9 41	3 84	3 64	1 19	1 15	2 35	2 20	17 32	16 40
Lanark	14 09	13 53	5 22	5 12	1 29	1 23	3 02	2 88	23 62	22 76
Group	18 05	17 87	7 07	6 82	1 92	1 84	3 63	3 36	30 67	29 89
Victoria	16 96	17 70	5 57	5 59	1 51	1 54	3 16	2 81	27 20	27 64
Peterborough	16 82	16 71	5 29	5 34	1 38	1 35	2 68	2 54	26 17	25 94
Haliburton	1 69	1 65	5 53	5 0	1 19	1 18	5 1	4 6	2 92	2 79
Hastings	13 21	12 85	5 07	5 10	1 40	1 40	2 77	2 63	22 45	21 98
Group	12 39	12 37	4 28	4 30	1 17	1 17	2 37	2 20	20 21	20 04
Muskoka	3 68	3 67	1 44	1 36	48	47	1 08	1 02	6 68	6 52
Perry Sound	3 14	3 20	1 08	1 08	37	38	94	91	5 53	5 57
Nipissing	3 20	3 11	92	88	30	28	65	65	5 07	4 92
Manitoulin	4 43	4 44	1 51	1 44	58	55	1 68	1 66	8 20	8 09
Algoma	2 99	2 85	72	67	24	22	56	51	4 51	4 25
Group	3 35	3 32	1 08	1 03	37	36	89	85	5 69	5 56
The Province	23 78	23 72	8 98	8 82	2 26	2 20	4 44	4 01	39 46	38 75

VALUES—LIVE STOCK.

TABLE IV. Showing by County Municipalities and groups of Counties the value of HORSES for 1897 and 1898, Milch Cows and other Cattle for 1898, and the total Cattle for 1897 and 1898.

Counties.	Horses.		Cattle.			
	1898.	1897.	Milch Cows	Other Cattle.	Total.	
					1898.	1897.
	\$	\$	\$	\$	\$	\$
Essex	1,010,118	915,170	498,362	423,758	922,120	823,597
Kent	1,456,307	1,304,093	601,030	728,976	1,330,006	1,112,477
Elgin	1,077,031	982,342	732,808	720,495	1,453,303	1,176,820
Norfolk	809,268	712,150	501,520	210,458	711,978	626,802
Haldimand	663,059	596,651	397,423	252,139	649,562	543,769
Welland	563,680	536,392	302,775	170,871	473,646	436,364
Totals	5,579,463	5,046,798	3,033,918	2,506,697	5,540,615	4,719,829
Lambton	1,154,308	1,028,951	645,776	969,371	1,615,147	1,487,451
Huron	2,006,511	1,874,568	1,043,712	1,417,805	2,461,517	2,262,407
Bruce	1,380,383	1,282,762	828,892	1,104,454	1,933,346	1,738,885
Totals	4,541,202	4,186,281	2,513,380	3,491,630	6,010,010	5,488,743
Grey	1,630,025	1,597,427	1,005,882	1,140,122	2,146,004	1,906,319
Simcoe	1,802,287	1,699,131	892,959	795,009	1,687,968	1,539,400
Totals	3,432,312	3,296,558	1,898,841	1,935,131	3,833,972	3,445,719
Middlesex	1,867,274	1,711,532	1,322,392	1,664,504	2,986,896	2,526,169
Oxford	1,206,644	1,134,669	1,154,734	782,082	1,966,816	1,744,487
Brant	555,577	494,747	407,340	210,992	618,332	529,528
Perth	1,409,736	1,290,139	1,021,061	948,613	1,969,674	1,682,808
Wellington	1,312,235	1,219,015	854,123	886,776	1,740,899	1,585,404
Waterloo	757,927	684,487	459,125	316,085	775,210	715,837
Dufferin	574,690	537,608	323,234	316,741	639,975	578,129
Totals	7,684,083	7,072,197	5,572,009	5,125,793	10,697,802	9,362,362
Lincoln	559,893	551,027	274,500	141,790	416,290	394,178
Wentworth	766,222	721,470	472,056	258,094	730,150	658,307
Halton	551,865	505,182	338,717	258,530	597,247	556,675
Peel	805,033	720,049	402,924	304,100	707,024	647,135
York	1,623,764	1,527,658	1,627,623	435,254	1,242,881	1,146,233
Ontario	1,242,251	1,147,559	655,272	537,695	1,192,967	1,110,111
Durham	799,096	785,639	644,669	363,992	828,661	749,161
Northumberland	910,478	916,608	713,768	314,904	1,028,672	932,353
Prince Edward	529,761	531,474	345,864	94,621	440,485	397,959
Totals	7,788,363	7,406,666	4,475,397	2,708,980	7,184,377	6,593,119
Lennox and Addington	566,861	514,796	477,185	181,133	658,318	563,549
Frontenac	569,442	537,662	643,915	220,401	864,316	756,883
Leeds	536,263	529,024	885,519	229,176	1,114,695	1,007,733
Grenville	333,290	342,492	58,903	129,675	688,578	612,172
Dundas	421,494	416,138	649,882	146,981	796,863	691,778
Stormont	377,663	326,293	532,150	125,022	657,172	591,153
Glengarry	579,704	482,046	650,548	194,789	845,337	805,180
Prescott	480,112	452,292	452,332	151,492	603,824	589,108
Russell	328,768	286,095	322,915	122,962	445,877	403,361
Carleton	938,691	933,130	828,160	448,825	1,276,985	1,318,785
Renfrew	804,452	765,742	548,897	471,980	1,020,877	965,367
Lanark	603,837	560,264	693,181	393,420	1,086,601	1,072,472
Totals	6,540,577	6,145,974	7,243,587	2,815,856	10,059,443	9,377,541
Victoria	712,469	644,172	397,399	420,539	817,938	734,259
Peterborough	525,261	519,226	499,595	218,601	718,196	675,101
Haliburton	97,234	88,942	81,799	60,033	141,832	129,200
Hastings	972,167	958,628	1,114,523	313,279	1,427,802	1,331,260
Totals	2,307,131	2,210,968	2,093,316	1,012,452	3,105,768	2,869,820
Muskoka	213,892	199,368	146,224	110,071	256,295	250,221
Parry Sound	200,224	189,917	127,109	102,073	229,182	217,907
Nipissing	89,884	81,200	39,211	34,183	73,394	77,710
Manitoulin	119,380	124,518	69,564	80,070	150,034	149,644
Algoma	163,385	151,360	75,745	69,617	145,362	130,942
Totals	786,765	746,363	458,253	396,014	854,267	826,424
The Province	38,659,896	36,111,805	27,293,701	19,992,553	47,286,254	42,683,557

VALUES—LIVE STOCK.

TABLE V. Showing by County Municipalities and groups of Counties the value of Sheep, Hogs and Poultry for the years 1897 and 1898.

Counties.	Sheep.		Hogs.		Poultry.	
	1898.	1897.	1898.	1897.	1898.	1897.
	\$	\$	\$	\$	\$	\$
Essex ..	98,619	98,806	443,206	321,931	75,716	77,712
Kent ..	190,966	156,388	546,783	392,454	95,371	82,573
Elgin ..	204,109	163,846	353,219	259,214	71,342	66,380
Norfolk ..	104,818	94,575	203,643	159,796	54,076	46,297
Haldimand ..	114,608	94,598	138,618	95,223	43,838	39,908
Welland ..	72,469	71,245	85,383	66,080	40,761	34,161
Totals ..	785,529	678,453	1,770,852	1,294,698	381,104	347,026
Lambton ..	198,230	193,457	300,122	218,441	82,395	76,603
Huron ..	351,813	339,083	334,989	234,983	112,040	100,819
Brace ..	388,348	346,073	250,577	172,447	77,757	71,657
Totals ..	938,391	876,615	885,688	625,871	272,192	249,079
Grey ..	423,533	376,023	338,543	244,349	105,878	92,324
Simcoe ..	363,815	365,429	423,130	320,649	104,982	98,309
Totals ..	787,348	741,452	761,673	564,998	210,860	190,633
Middlesex ..	316,824	262,173	406,727	315,778	142,455	129,433
Oxford ..	87,064	79,086	353,505	262,880	74,216	64,698
Brant ..	83,919	70,273	138,067	112,139	34,472	28,683
Perth ..	144,509	175,471	312,087	203,746	80,167	71,191
Wellington ..	348,747	328,738	339,248	245,668	83,582	74,849
Waterloo ..	104,689	92,484	171,707	122,317	45,068	41,802
Dufferin ..	133,296	116,623	157,044	114,984	45,312	42,775
Totals ..	1,259,048	1,124,848	1,878,385	1,377,512	505,272	453,431
Lincoln ..	67,420	66,189	92,255	58,892	32,860	31,350
Wentworth ..	96,082	81,865	153,671	107,853	41,611	36,561
Halton ..	89,473	84,445	93,841	80,322	37,975	34,343
Peel ..	81,009	76,882	173,514	133,948	61,188	58,179
York ..	167,767	167,822	313,443	235,110	79,349	79,092
Ontario ..	192,495	181,851	238,980	184,787	70,706	67,384
Durham ..	154,308	138,213	150,121	109,348	54,428	50,014
Northumberland ..	116,532	111,665	193,800	147,683	59,114	50,844
Prince Edward ..	38,092	40,640	84,967	53,863	33,121	29,311
Totals ..	1,003,178	949,572	1,494,592	1,111,806	470,352	437,082
Lennox and Addington ..	77,369	61,630	124,569	87,782	33,567	28,300
Frontenac ..	97,805	95,927	108,751	89,849	40,616	36,759
Leeds ..	64,997	74,518	156,172	131,677	55,488	42,007
Grenville ..	49,421	46,975	89,569	73,169	40,780	38,565
Dundas ..	36,563	38,023	108,639	74,823	45,342	40,326
Stormont ..	37,182	36,438	76,504	63,316	34,735	27,175
Glengarry ..	70,380	62,350	110,815	81,482	36,455	30,024
Prescott ..	50,041	48,997	82,100	76,756	32,716	27,042
Russell ..	45,501	34,048	52,357	47,342	22,276	23,057
Carleton ..	139,291	140,784	141,613	129,984	80,045	70,441
Renfrew ..	230,893	203,995	139,688	124,069	48,088	45,583
Lanark ..	195,113	197,291	104,535	83,592	48,167	41,960
Totals ..	1,094,556	1,030,976	1,295,312	1,063,841	518,273	451,239
Victoria ..	159,314	137,309	133,202	97,106	54,044	42,540
Peterborough ..	104,877	104,034	123,415	90,158	49,484	44,871
Haliburton ..	29,635	28,047	16,184	11,848	6,344	5,373
Hastings ..	113,782	114,287	252,480	195,407	65,434	56,341
Totals ..	406,608	383,677	524,281	394,519	175,306	149,125
Muskoka ..	67,536	61,885	25,029	20,595	12,669	11,914
Parry Sound ..	64,403	56,832	28,758	23,032	12,536	10,638
Nipissing ..	5,611	7,575	13,735	17,670	4,225	4,155
Manitoulin ..	57,008	52,263	22,061	19,828	7,019	5,932
Algoma ..	30,479	27,046	19,876	18,840	8,926	7,789
Totals ..	225,037	205,601	109,459	99,965	44,775	40,423
The Province ..	6,499,695	6,003,194	8,720,242	6,533,210	2,578,136	2,318,038

VALUES OF LIVE STOCK SOLD.

TABLE VI. Showing by County Municipalities and groups of Counties the value of Live Stock sold or killed for the years ending June 30th, 1897 and 1898.

Counties.	Horses.	Cattle.	Sheep.	Hogs.	Poultry.	Totals.	
						1898.	1897.
	\$	\$	\$	\$	\$	\$	\$
Essex.....	48,662	218,316	53,752	477,260	33,704	814,694	671,899
Kent.....	111,475	480,450	65,937	695,856	40,070	1,393,788	1,093,056
Elgin.....	81,024	484,192	81,457	487,168	37,638	1,176,479	1,075,004
Norfolk.....	63,232	146,136	38,932	276,366	21,679	546,345	500,748
Haldimand.....	49,266	155,172	40,882	189,967	23,329	458,116	385,580
Welland.....	31,482	151,947	36,010	117,951	29,039	366,429	315,416
Totals.....	385,141	1,611,213	299,470	2,244,568	185,459	4,755,851	4,044,703
Lambton.....	84,282	676,665	72,749	388,763	38,680	1,261,139	1,108,276
Huron.....	239,098	1,176,567	139,984	513,058	42,760	2,111,377	1,896,499
Bruce.....	112,667	862,912	147,749	326,618	29,625	1,479,591	1,324,227
Totals.....	435,957	2,716,144	360,502	1,226,439	111,065	4,852,107	4,329,002
Grey.....	105,080	772,125	146,088	431,265	36,286	1,491,844	1,443,665
Simcoe.....	131,166	700,513	132,393	579,190	41,645	1,584,907	1,287,911
Totals.....	237,246	1,472,638	278,481	1,010,455	77,931	3,076,751	2,731,576
Middlesex.....	171,456	1,298,799	125,493	595,943	70,842	2,262,533	1,636,397
Oxford.....	95,025	817,378	46,471	550,754	39,927	1,545,555	1,301,636
Brant.....	25,840	226,354	30,728	189,782	15,731	488,395	456,280
Perth.....	133,840	765,181	69,985	445,369	27,087	1,441,462	1,198,230
Wellington.....	99,099	1,017,728	139,420	493,570	39,689	1,789,506	1,483,038
Waterloo.....	47,400	611,716	53,793	302,382	17,472	1,032,763	892,359
Dufferin.....	51,700	291,254	49,863	239,436	22,790	655,043	540,367
Totals.....	624,320	5,028,410	515,753	2,817,236	229,538	9,215,257	7,528,307
Lincoln.....	34,496	150,569	37,980	141,113	24,756	388,914	330,525
Wentworth.....	45,866	225,141	42,407	217,174	27,070	557,658	445,659
Halton.....	30,256	228,327	33,056	153,278	22,731	467,648	419,499
Peel.....	65,860	283,998	35,231	241,857	38,599	665,545	555,264
York.....	111,220	505,387	110,637	459,258	34,004	1,224,506	1,084,569
Ontario.....	113,004	491,696	63,323	377,899	27,401	1,074,323	994,748
Durham.....	86,475	361,139	50,833	205,206	20,924	728,577	621,552
Northumberland.....	59,231	273,695	34,289	255,232	26,566	649,013	629,752
Prince Edward.....	35,052	62,253	18,910	128,953	11,512	256,680	218,868
Totals.....	581,460	2,537,205	426,666	2,179,970	237,563	6,012,864	5,300,436
Lennox and Addington.....	55,332	155,403	28,083	169,521	14,246	422,585	319,691
Frontenac.....	14,711	114,135	30,663	120,346	20,706	300,531	292,719
Leeds.....	33,299	129,376	22,326	186,291	18,093	389,385	356,404
Greenville.....	17,920	88,063	16,131	93,731	10,656	226,501	199,229
Dundas.....	24,528	105,441	15,254	121,261	13,641	285,125	273,308
Stormont.....	25,462	76,852	17,244	87,000	11,513	218,071	198,459
Glengarry.....	48,135	112,167	24,103	108,422	13,567	306,434	246,035
Prescott.....	27,966	74,709	16,813	85,095	14,177	218,760	204,683
Russell.....	22,016	75,348	20,283	70,821	10,179	198,647	175,276
Carleton.....	77,700	286,256	52,605	190,999	34,828	642,388	554,738
Renfrew.....	36,245	229,865	64,983	147,436	17,215	495,744	481,133
Lanark.....	42,360	267,817	74,647	145,039	18,548	543,411	500,140
Totals.....	425,704	1,715,402	383,135	1,525,962	202,369	4,252,572	3,801,905
Victoria.....	60,770	327,007	49,614	203,412	23,256	664,059	546,236
Peterborough.....	38,500	162,596	30,633	231,766	22,240	485,735	398,344
Haliburton.....	9,200	38,090	8,926	18,047	1,657	75,920	62,641
Hastings.....	36,384	218,238	38,099	267,504	23,848	583,073	546,865
Totals.....	144,854	745,931	127,272	720,729	70,001	1,808,787	1,554,086
Muskoka.....	11,424	66,021	23,793	31,163	5,942	138,343	126,819
Parry Sound.....	17,226	57,565	19,378	33,871	3,769	131,009	129,229
Nipissing.....	3,710	15,030	1,580	8,716	2,227	31,263	29,854
Manitoulin.....	6,750	40,747	16,057	27,794	2,887	94,235	93,960
Algoma.....	10,395	35,253	8,292	23,632	3,172	80,744	83,722
Totals.....	49,505	214,616	69,100	125,176	17,997	476,394	463,584
The Province.....	2,884,187	16,121,559	2,460,379	11,852,535	1,131,923	34,450,583	29,753,599

VALUES—LIVE STOCK PER HEAD.

TABLE VII. Showing by County Municipalities and groups of Counties the value per head of the several classes of Horses and Cattle in the Province for the year 1898, and also the value per head of all Horses and Cattle sold for the same period.

Counties.	Horses.						Cattle.			
	Work- ing horses.	Breed- ing mares.	Colts.	Stal- lions.	Horses sold in year.	Work- ing oxen.	Milch cows.	Store cattle.	Other cattle.	Cattle sold in year.
	\$	\$	\$	\$	\$	\$	\$ c.	\$ c.	\$ c.	\$ c.
Essex	63	62	41	250	58	40	27 75	24 41	13 62	21 37
Kent	65	72	47	322	65	40	29 51	28 70	13 74	32 31
Elgin	66	68	55	460	64	40	32 51	31 46	14 34	34 09
Norfolk	64	65	47	225	64	40	27 55	20 43	10 13	20 45
Haldimand	61	66	47	250	63	35	29 59	25 38	13 12	21 80
Welland	64	57	42	275	66	40	29 45	22 08	12 56	26 96
Group	64	66	47	310	63	39	29 52	27 39	13 19	27 66
Lambton	67	60	46	350	66	40	29 94	31 01	12 77	31 33
Huron	74	82	48	375	77	45	31 15	30 30	12 73	34 14
Bruce	70	70	42	265	61	45	29 21	29 72	12 43	31 59
Group	71	73	46	339	70	45	30 18	30 32	12 64	32 58
Grey	63	64	42	273	52	45	28 43	26 92	11 67	26 85
Simcoe	68	70	43	409	63	45	28 01	22 41	11 94	27 65
Group	65	67	43	359	58	45	28 23	24 99	11 79	27 22
Middlesex	67	71	48	372	76	40	32 56	37 46	14 43	35 53
Oxford	70	70	51	263	75	...	31 16	31 69	13 19	34 88
Brant	62	59	50	400	60	...	32 38	24 81	12 62	33 18
Perth	73	77	48	318	80	46	30 68	29 05	12 94	32 59
Wellington	61	71	44	284	63	...	32 72	26 40	13 10	38 12
Waterloo	65	64	40	336	60	45	31 25	28 46	12 19	38 78
Dufferin	61	60	36	263	55	40	28 10	22 80	10 70	27 22
Group	66	70	46	328	70	41	31 52	30 97	13 11	35 05
Lincoln	67	65	42	300	64	...	30 50	25 17	13 22	27 77
Wentworth	66	71	52	300	71	50	30 20	26 35	12 72	27 94
Halton	69	59	49	300	62	50	32 41	24 68	13 09	33 00
Peel	67	73	50	400	74	...	30 27	26 61	13 13	34 32
York	74	78	51	467	67	...	32 34	25 00	12 85	29 79
Ontario	70	79	51	400	73	...	32 78	23 80	12 95	31 33
Durham	62	65	46	300	75	...	29 94	25 18	12 79	29 90
Northumberland	59	60	45	250	61	40	28 10	24 22	10 63	25 83
Prince Edward	58	55	40	200	69	...	24 02	18 77	9 39	20 03
Group	66	70	48	365	69	47	30 10	24 81	12 41	29 64
Lennox and Addington	58	59	40	300	53	40	24 62	19 14	9 75	21 37
Frontenac	58	62	41	300	47	40	25 40	19 45	9 09	17 49
Leeds	53	53	36	260	67	40	25 70	20 21	8 38	20 75
Grenville	54	49	35	200	56	...	26 86	20 90	10 57	21 22
Dundas	60	48	34	200	56	...	27 36	20 28	9 25	21 00
Stormont	59	51	37	200	58	...	25 32	18 84	9 33	18 39
Glengarry	67	73	36	200	65	40	23 82	18 72	9 81	18 34
Prescott	60	72	38	300	59	40	22 62	17 71	10 44	17 67
Russell	61	66	39	250	64	...	26 20	16 11	10 65	22 22
Carleton	69	76	43	208	70	40	25 94	19 85	10 67	24 97
Renfrew	64	62	34	300	55	40	23 06	19 91	10 00	21 27
Lanark	63	58	36	250	60	40	25 54	20 79	10 72	23 94
Group	61	63	38	263	60	40	25 22	19 65	9 93	21 29
Victoria	62	62	35	200	59	40	27 08	22 58	11 70	27 36
Peterborough	57	58	42	200	55	40	26 47	19 28	9 27	20 46
Haliburton	56	48	38	175	50	45	23 89	18 52	7 43	14 45
Hastings	61	58	40	175	48	40	25 09	18 75	9 51	20 02
Group	60	59	39	186	54	43	25 72	20 48	10 03	22 31
Muskoka	70	67	42	200	51	47	25 83	18 80	9 45	18 54
Parry Sound	72	69	42	200	54	42	26 47	20 50	9 18	18 88
Nipissing	71	71	45	200	53	45	23 88	20 06	9 04	20 76
Manitoulin	68	60	36	200	45	44	25 34	23 20	10 22	19 59
Algoma	86	96	47	250	77	43	30 01	20 71	11 64	23 30
Group	73	72	42	205	55	45	26 35	20 51	9 83	19 64
The Province	65	64	44	303	65	43	28 28	26 49	11 91	29 18

VALUES—LIVE STOCK PER HEAD.

TABLE VIII. Showing by County Municipalities and groups of Counties the value per head of Sheep, Hogs and Poultry in the Province for the year 1898, and also the value of each per head sold for the same period.

Counties.	Sheep.			Hogs.			Poultry.			
	Over 1 year.	Under 1 year.	Sold in year.	Over 1 year.	Under 1 year.	Sold in year.	Turkeys	Geese.	Other fowls.	Sold in year.
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	c.	c.	c.	c.
Essex	3 84	2 53	3 46	11 96	3 44	7 58	58	60	21	30
Kent	5 12	2 86	3 82	12 12	4 05	7 63	67	54	22	33
Elgin	5 02	3 13	3 93	13 11	4 11	7 32	62	59	22	37
Norfolk	4 39	2 66	3 53	12 35	3 59	6 87	60	52	21	31
Haldimand	4 98	3 23	3 78	12 22	4 27	7 53	62	60	24	31
Welland	4 44	2 82	3 52	12 05	4 09	7 52	73	64	23	41
Group	4 71	2 90	3 72	12 28	3 87	7 44	63	58	22	34
Lambton	5 07	3 12	3 91	12 07	3 96	7 04	57	53	20	40
Huron	5 24	3 18	3 74	12 83	4 09	7 27	58	50	21	36
Bruce	5 10	3 09	3 83	12 54	3 95	6 58	63	52	22	36
Group	5 15	3 13	3 81	12 49	4 01	7 00	59	51	21	37
Grey	4 73	3 00	3 74	12 45	4 18	7 22	61	52	22	34
Simcoe	4 78	2 71	3 48	12 14	3 58	6 86	62	51	22	38
Group	4 75	2 87	3 61	12 27	3 83	7 01	61	51	22	36
Middlesex	5 93	3 49	4 52	13 44	4 20	7 21	64	57	22	40
Oxford	5 23	3 06	4 51	14 00	4 42	8 03	67	62	22	42
Brant	5 72	3 18	4 35	14 75	4 14	7 69	66	58	23	35
Perth	5 07	3 12	3 69	13 25	4 25	7 34	63	54	20	37
Wellington	5 32	3 08	4 18	15 20	4 21	7 44	66	52	22	42
Waterloo	4 58	3 05	3 94	10 78	3 86	7 73	66	56	22	32
Dufferin	4 50	2 91	3 69	11 26	3 58	6 75	58	52	21	43
Group	5 27	3 16	4 17	13 41	4 15	7 46	64	55	22	39
Lincoln	4 81	3 16	3 60	14 15	3 89	7 95	55	53	24	38
Wentworth	5 42	3 48	4 62	14 26	4 57	7 51	64	62	24	39
Halton	5 71	3 01	3 81	14 67	3 88	7 07	68	55	23	40
Peel	5 12	3 35	4 41	15 67	4 04	7 00	70	65	23	38
York	5 02	3 00	4 39	14 43	3 79	6 50	62	60	23	37
Ontario	5 40	2 96	4 20	13 30	3 65	7 29	63	55	22	32
Durham	5 06	2 90	3 80	12 99	3 76	7 29	67	59	22	40
Northumberland	4 92	2 69	3 24	13 70	3 91	7 62	59	54	22	37
Prince Edward	4 72	2 85	3 12	13 52	4 10	8 34	66	49	22	35
Group	5 16	3 01	4 00	14 04	3 91	7 21	64	58	23	37
Lennox and Addington	4 44	2 73	3 30	13 97	4 32	7 68	66	55	21	33
Frontenac	4 52	2 93	2 85	12 16	4 23	7 41	55	56	22	33
Leeds	3 62	2 54	3 13	11 01	3 79	8 13	75	56	21	35
Grenville	4 31	3 05	3 46	12 00	3 86	8 72	69	57	23	33
Dundas	4 03	2 34	3 34	12 66	3 69	7 47	64	55	22	43
Stormont	4 36	2 69	3 42	12 24	4 02	7 93	63	58	22	35
Glengarry	4 08	2 61	3 11	12 45	3 92	8 89	70	53	22	35
Prescott	3 62	2 43	2 83	11 55	3 57	10 72	60	52	22	38
Russell	3 47	2 62	2 91	10 13	3 49	8 66	68	65	23	40
Carleton	4 30	2 75	3 20	12 20	3 09	9 09	74	56	24	38
Renfrew	3 80	2 52	3 35	10 90	2 94	9 52	68	57	23	38
Lanark	4 10	2 74	3 32	12 77	2 87	8 27	69	59	22	40
Group	4 04	2 66	3 15	11 91	3 62	8 41	68	57	22	37
Victoria	4 30	2 63	3 35	11 19	3 53	7 59	59	56	23	42
Peterborough	5 06	2 92	3 29	12 04	3 77	7 78	55	54	22	45
Haliburton	3 60	2 31	2 52	8 74	3 22	6 92	65	47	20	25
Hastings	3 80	2 32	3 48	11 38	4 02	7 85	58	57	23	32
Group	4 25	2 57	3 30	11 34	3 79	7 73	58	55	22	38
Muskoka	4 31	2 53	3 28	11 61	3 76	7 52	60	55	21	35
Parry Sound	4 24	2 54	3 28	13 68	3 68	7 62	66	73	22	34
Nipissing	4 10	2 25	3 52	11 59	3 33	7 81	65	65	24	37
Manitoulin	4 25	2 49	2 92	9 62	3 67	7 40	56	54	23	33
Algoma	4 44	2 47	3 80	11 85	2 92	8 00	63	70	23	34
Group	4 29	2 51	3 25	11 76	3 52	7 63	62	65	22	35
The Province	4 76	2 91	3 70	12 63	3 91	7 44	63	55	22	37

MARKET

TABLE IX. Showing the average price of Agricultural Products at the leading markets of Ontario for

Products.	Barrie.	Belleville.	Bowmanville.	Brampton.	Brantford.	Brockville.	Chatham.	Cobourg.	Essex.	Goderich.	Guelph.	Hamilton.	Kingston.	Lindsay.
FALL WHEAT: per bush.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
July	75 0	75 8	75 0	76 5	76 3	88.3	71.3	85.0	66 3	75.0	80.0	75 5	78.0	79 0
August	65.9	67 5	72 5	74 0	65.0	71 5	65 9	72.5	61.5	69.4	66.6	68 8	74.0	70.0
September	62.3	62 5	67 3	65 9	64.9	72 3	64 7	65.0	61.7	65 6	66 2	66 8	70 0	65 6
October	62.8	63.6	67 5	68.6	65.1	72 0	65 1	62.5	60.5	65 9	63.8	66 9	70 0	66.0
November	64.3	69.0	71 0	71 0	68.0	73 6	69.0	64.1	65.5	68.6	65.8	70 5	70 0	69.0
December	63.6	69.0	70.2	68 5	67.1	73.3	66.4	66 5	66.0	67.0	65.8	70 0	70 0	67.0
Average ... { 1898.	65 6	67 4	70 2	70.9	67.6	76.0	67 2	69.4	63 5	68 8	68.0	69.8	72.0	69.7
1897.	68.8	76 2	81 8	74.9	75.6	91 6	79 4	...	77.2	75.8	79 3	78 2	82.4	77 5
1896.	67.0	72 2	71.0	69 7	76 8	68.2	...	...	64.2	68 6	...	70.1	77 4	69 3
SPRING WHEAT: per bush														
July	...	75 8	75 0	67.5	76 3	83.7	...	85 6	...	75.0	72 5	75 0	75 8	79.0
August	...	67.5	71 3	65 0	65.0	71.8	...	72 5	...	69.4	67 5	65.8	72 5	70.0
September	...	62.5	64 5	57.4	64.9	70.3	...	65.0	...	65.6	62.7	65.3	67 5	65.6
October	...	63 6	65 0	66 0	65.1	70.5	...	62.5	...	65 9	61 8	61 8	67 5	66 0
November	...	69.0	70 0	71 0	68 0	71 8	...	63 8	...	68 6	67.0	67 0	67 5	69.0
December	...	69.0	68 7	66.0	67.1	71.8	...	65 0	...	67.0	67 8	68.0	67 5	67.0
Average ... { 1898	...	67.4	68 6	65 2	67 6	74.0	...	69 2	...	68 5	66.4	67.2	69.7	69.7
1897	...	79 1	76 0	91.6	69 3	78.2	...	...	...	...	...	67.4	71.8	74.9
1896.	...	72.9	72.2	69 6	...	...	...	...	...	...	57.1	...	77.9	64.8
BARLEY: per bush.														
July	30.0	35 8	31.3	31 0	40.0	37.0	32.4	30 0	30 0	40.0	...	36 8	29.0	33.5
August	30.3	35 8	31 9	32 4	30 6	36 0	30 5	35 0	30.0	40.0	36 0	41 0	29.0	33.5
September	31.5	35 0	32.9	39.1	33 5	36 0	32.2	40 0	31.5	37.5	40.4	39.7	29.0	36.2
October	31.5	40.4	33 8	45.3	36 9	36 0	32.0	30.5	32.5	37.4	42 8	43.0	37 5	38.9
November	35.9	43.5	36 6	49.0	40.6	36 0	37.3	39.0	32.5	37.0	47.9	45.2	41.5	44.0
December	35.8	43 5	35.5	48 0	42.2	36.0	37.5	46.5	32.5	37.0	45.8	47 6	43 5	42.5
Average ... { 1898	32.5	38 9	33 9	40.0	37.3	36.2	33.8	37.2	31.4	38 2	43 3	42.2	34 3	37.6
1897	23.8	28.5	28.1	24 4	26 3	32.0	21.4	...	...	28 8	31.3	26.0	24.0	21.8
1896	29.1	29 8	29 3	30.4	28 6	36.9	41.9	...	...	...	36.5	35.5	28.3	25 8
OATS: per bush.														
July	28.5	25 8	25.0	25 5	27.9	29.1	26.8	30 0	27.0	25 5	27.9	30.9	26 5	26.2
August	28.7	27.0	25.0	25.0	27.4	30 5	23 9	26.0	23.8	24.1	28 3	30.3	26 0	25.0
September	25.0	24.5	22.0	23 6	23.5	23 7	21 9	22.0	21.0	22.6	23.3	25.3	23 1	23.4
October	24 5	22 3	22 8	25.3	24.5	24.0	23.1	23.5	21.1	24 6	25.1	26.6	23.3	24.5
November	25.0	23 0	25.0	27.0	27.4	26.0	24.9	26.8	22.0	25.9	27 0	30 3	25 3	26.5
December	25.6	23 0	26.0	27.0	29.3	27.5	26.6	28.0	22.2	26 5	27.8	30 1	25 3	26.0
Average ... { 1898	26.3	24.2	24.2	25.4	26.6	27.2	24.5	26.0	23.0	24.7	26.5	29.0	24 8	25.2
1897	22.1	20.4	20 6	21.9	23.2	25.4	21.2	...	19 9	21 6	23.4	25.1	22 7	22.4
1896	18.2	19.5	17 8	20 2	19.3	23 9	16.5	...	15.8	18.7	21.6	22.7	20.4	18.7
RYE: per bush.														
July	...	43.3	45 0	...	40.0	44.0	...	50.0	...	...	44.0	41.8	50 0	45.0
August	...	41 7	45 0	...	36 4	44 0	...	45.0	...	...	44 5	41.0	45 8	42.5
September	...	40.0	42.3	...	36 6	41.0	...	40 0	...	...	38.7	41.0	44 0	36 0
October	40 1	43 8	43.0	...	40 3	41 0	...	40.0	...	...	40 6	43.3	46 9	42.3
November	43 5	48.5	49.2	...	46.5	44 0	...	48.0	...	...	43.6	48.0	52 6	47.0
December	44.3	48 5	50.3	...	48.5	44.8	...	48.0	...	...	48 5	51.3	54.0	47.0
Average ... { 1898	42.7	44.1	45 8	...	41.5	43.3	...	45.2	...	...	43.3	44.4	48 5	43.1
1897	38 1	39 7	41.7	...	38 1	41.2	25 0	...	...	38 8	39 7	...	40.1	36.3
1896	36 3	38 2	34.4	...	34.9	40.4	29 5	...	...	...	36.3	42.5	37.8	33.9
PEAS: per bush.														
July	45.0	49.3	52.5	42.5	45 6	55 5	...	61.5	48 0	45.0	48.1	50 8	46 0	49.0
August	45 0	51.8	53.1	43 5	44.5	51.0	...	55.8	48 0	46 1	53.0	46.5	49 3	47.8
September	46.6	52.5	55 0	46.6	42.8	51.0	38.5	60.0	48.0	48 0	51.3	46.5	51.9	50.5
October	53 0	52 5	56 3	51.1	47.5	52 7	42.5	51 0	48.0	53.1	54 0	53.1	52.3	56.4
November	58.2	56 0	61.4	55 0	55 6	59 0	45.0	57.9	48 0	58 5	60.0	58.7	57.6	64.6
December	59.6	56.0	60.5	55 0	57.9	61.0	45.0	61.6	48.0	59 0	63.0	59.0	58 5	60.9
Average ... { 1898	51.3	53.0	56 9	48.4	49.4	55.3	42 8	56 3	48.0	51.2	55.1	52.4	52.3	54.5
1897	41.0	42.8	41.3	40.1	39.8	44 3	...	...	...	39.7	44.1	41.2	44.3	41.2
1896	41.7	43.8	42.3	43.7	42.0	47.4	...	...	...	41.7	44.4	50.4	44.9	45.5

PRICES.

July-December, 1898, and the average for the half year and for the Province for the years 1896, 1897 and 1898

London.	Orangeville.	Owen Sound.	Pembroke.	Perth.	Peterborough.	Ridgetown.	St. Thomas.	Simcoe.	Stratford.	Toronto.	Walkert.n.	Waterloo.	Whitby.	Woodstock.	The Province.		
															1898.	1897.	1896.
cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
77.3	71.0	80.0	94.7	85.0	78.1	73.8	77.0	69.3	72.5	79.2	73.3	77.4	70.8	78.8	77.2	69.6	64.7
65.3	65.0	68.5	89.0	85.0	66.9	66.6	70.8	67.5	67.0	71.7	65.0	68.0	64.9	69.0	69.7	75.7	62.9
67.0	65.0	68.5	89.0	85.0	61.0	64.1	65.5	63.3	65.0	63.6	61.6	68.0	65.0	65.8	66.7	83.8	63.0
65.8	61.3	64.8	66.0	87.5	61.3	64.8	64.3	61.6	62.5	69.8	64.8	64.8	65.8	61.0	66.2	78.6	71.5
71.8	60.0	68.4	67.0	87.5	69.0	70.0	65.5	70.5	66.0	73.9	70.0	68.0	66.5	69.5	68.9	80.0	81.5
68.4	66.7	68.4	67.8	87.5	63.4	68.6	68.3	67.5	65.8	70.2	67.0	66.2	64.6	67.8	68.4	80.4	82.9
69.1	65.1	69.9	78.2	86.6	66.9	67.8	63.4	66.8	66.4	72.0	67.3	68.6	66.1	69.2	69.4	.....	.....
78.8	76.2	76.7	79.9	85.7	78.6	76.8	77.6	72.9	76.5	80.6	78.3	79.5	74.4	77.1	.....	78.2	.....
69.6	70.0	74.9	75.0	82.6	67.7	66.8	67.3	67.4	68.2	75.2	71.5	69.7	73.3	69.8	.....	.....	71.0
78.0	69.0	.....	94.7	85.0	77.5	.....	.....	.....	.....	.....	75.8	.....	70.8	.....	77.5	68.2	65.6
.....	65.0	.....	83.4	88.3	66.3	.....	.....	.....	.....	.....	65.4	.....	64.3	.....	70.1	75.0	64.0
66.5	65.0	.....	74.0	90.0	61.0	.....	.....	.....	.....	.....	64.6	.....	65.0	.....	65.6	87.1	63.4
55.8	59.4	.....	66.0	87.5	64.0	.....	.....	.....	.....	67.6	64.8	.....	65.8	.....	66.2	81.5	70.0
72.0	57.5	.....	67.0	87.5	69.0	.....	.....	.....	.....	72.3	70.0	.....	66.5	.....	63.8	78.7	79.9
.....	63.7	.....	67.8	87.5	63.3	.....	.....	.....	.....	67.7	67.0	.....	64.6	.....	68.3	80.1	81.0
70.4	63.5	.....	74.7	87.8	66.6	.....	.....	.....	.....	69.1	67.8	.....	66.0	.....	69.2	.....	.....
77.9	73.1	.....	81.0	85.7	76.6	.....	.....	.....	.....	.....	70.0	.....	75.1	.....	.....	78.6	.....
69.3	67.5	.....	74.6	79.6	63.9	.....	.....	.....	.....	.....	70.6	69.7	75.3	.....	.....	.....	70.6
40.8	33.0	31.0	47.0	.....	.....	35.5	41.7	33.8	35.0	33.1	27.5	.....	32.5	46.5	34.7	25.7	33.5
31.8	30.0	35.0	44.6	40.0	.....	35.5	45.0	33.8	35.0	36.2	27.5	.....	33.8	46.5	35.0	26.2	32.6
41.0	30.0	39.1	35.0	40.0	33.8	35.2	42.0	30.0	34.0	44.2	28.6	.....	39.8	33.5	25.9	27.2	31.9
38.0	35.6	41.0	35.0	40.0	38.8	35.0	39.0	32.5	32.5	48.3	36.3	.....	41.9	39.0	37.9	27.7	31.2
44.3	37.5	46.3	35.0	40.0	45.1	38.7	39.0	46.7	40.6	52.3	40.5	.....	48.4	44.4	41.8	27.3	31.4
45.2	43.4	44.2	36.3	40.0	46.8	35.5	49.0	50.0	42.5	49.5	41.0	.....	44.9	45.0	42.4	27.8	28.8
40.4	35.2	39.5	38.6	40.0	41.3	35.7	40.9	36.4	36.7	44.1	33.4	.....	40.9	42.1	38.0	.....	.....
29.9	24.2	30.3	28.0	40.0	24.0	.....	19.2	26.8	23.2	29.4	27.5	28.0	24.8	31.1	.....	27.0	.....
25.2	28.3	32.0	37.7	36.2	31.9	.....	45.1	24.3	24.8	33.8	29.0	29.0	29.3	34.2	.....	.....	31.6
31.3	24.9	28.5	27.5	25.0	25.3	29.8	34.2	27.3	26.0	31.8	31.3	27.3	22.7	27.0	27.8	22.5	20.9
31.0	23.2	28.5	27.0	24.7	28.1	28.1	32.0	27.0	25.0	29.8	25.0	25.0	24.3	26.0	26.9	23.4	19.7
25.8	22.5	23.8	22.0	24.0	24.3	23.8	27.8	22.5	23.2	28.1	24.3	25.0	21.5	23.1	23.8	23.1	18.6
25.5	22.5	23.8	22.0	24.0	23.4	24.3	24.7	23.1	23.0	28.9	23.1	23.0	22.4	21.5	24.0	21.7	19.5
29.0	22.5	25.3	24.5	26.0	26.3	25.8	24.0	26.7	24.3	32.1	26.0	23.0	25.5	25.5	25.9	31.6	21.2
28.2	25.9	26.8	25.5	26.6	26.5	25.1	25.5	29.0	25.4	30.9	26.6	27.0	26.3	22.5	26.8	22.9	19.8
28.3	23.7	23.1	24.7	25.2	25.6	26.0	27.8	25.4	24.5	30.2	25.9	25.1	23.9	24.3	25.8	.....	.....
23.6	20.1	23.0	19.7	22.7	23.6	21.9	23.1	23.9	21.5	26.3	21.4	24.7	21.0	21.7	.....	22.6	.....
19.7	18.4	20.5	21.4	21.0	19.8	19.7	19.2	18.3	18.7	22.9	20.9	21.7	20.7	19.7	.....	.....	20.0
.....	43.0	.....	41.0	42.0	46.0	55.0	.....	35.0	.....	43.5	41.0	.....	47.5	47.5	44.5	31.9	41.8
.....	35.0	.....	41.0	42.0	40.0	55.0	.....	34.3	.....	43.4	41.0	.....	43.8	47.5	42.5	34.0	39.1
46.0	35.0	.....	35.0	40.0	35.4	.....	.....	35.8	.....	42.7	40.2	.....	33.9	47.5	39.8	39.2	35.4
46.3	35.0	.....	35.0	40.0	38.9	.....	.....	40.0	.....	46.1	37.0	.....	41.0	47.5	41.6	39.0	34.8
46.3	35.0	.....	35.0	45.0	45.4	.....	.....	44.5	.....	49.8	39.0	.....	45.0	47.5	45.3	40.3	34.5
47.6	48.9	.....	35.0	45.0	50.0	.....	.....	47.5	.....	51.7	41.0	.....	48.0	47.5	47.5	41.1	34.1
46.7	39.2	.....	36.9	42.5	42.3	55.1	.....	38.9	.....	46.3	39.9	.....	43.9	47.5	43.5	.....	.....
35.2	40.1	.....	30.0	36.5	37.2	30.0	.....	36.8	.....	41.3	42.7	.....	38.2	.....	.....	37.7	.....
31.1	.....	40.0	37.7	34.3	33.8	.....	.....	32.4	.....	39.9	46.0	.....	32.0	.....	.....	.....	36.6
53.0	46.6	48.5	48.3	50.0	52.0	.....	57.5	41.3	46.0	52.2	56.0	.....	47.5	50.0	49.5	40.1	46.5
.....	47.5	47.5	46.6	50.0	49.0	.....	57.5	43.8	47.0	56.7	50.0	.....	50.6	50.0	49.7	41.0	45.6
50.8	47.5	48.7	47.0	50.0	49.6	.....	53.8	43.5	48.0	53.3	50.0	.....	50.0	50.0	49.0	43.2	42.8
51.0	47.5	53.7	53.0	50.0	51.1	.....	47.5	46.0	50.8	54.8	52.5	.....	50.0	50.0	51.2	43.2	43.4
55.5	47.5	57.3	51.8	55.0	58.4	.....	42.5	53.7	57.0	67.6	59.0	.....	50.0	56.3	56.2	42.6	43.6
58.0	60.0	61.5	57.3	55.0	60.6	.....	45.5	57.5	54.0	61.3	61.3	.....	51.9	57.5	57.5	42.5	42.1
53.9	49.7	53.0	51.2	51.9	53.3	.....	50.3	46.7	50.5	57.6	54.6	.....	50.1	52.4	52.2	.....	.....
41.8	41.9	41.1	40.2	44.5	42.8	.....	39.2	41.6	41.1	46.5	39.5	45.6	41.6	41.3	.....	42.1	.....
38.8	42.6	42.9	41.7	44.1	43.3	.....	44.5	38.3	43.7	46.4	45.4	43.0	50.6	48.4	.....	.....	44.0

MARKET

TABLE 1X. Showing the average price

Products.	Barrie.	Belleville.	Bowmanville.	Brampton.	Brantford.	Brockville.	Chatham.	Cobourg.	Essex.	Goderich.	Guelph.	Hamilton.	Kingston.	Lindsay.
CORN (in ear): per bush.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
October	...	...	...	...	22.9	19.5	16.5	...	26.0	...	...	...	...	...
November	...	...	...	...	21.9	20.5	13.7	...	26.5	...	...	...	...	...
December	...	...	...	...	21.8	20.5	15.7	...	27.7	...	...	...	...	...
Average ... { 1898	...	...	...	...	22.2	20.2	15.1	...	26.6	...	...	...	...	...
{ 1897	...	...	...	...	18.8	20.5	23.0	...	26.0	...	...	...	...	...
{ 1896	...	...	...	...	18.1	19.8	22.9	...	25.7	...	...	...	...	...
BUCKWHEAT: per bush.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
October	33.1	36.3	36.3	...	35.0	36.0	45.0	35.0	...	...	...	...	36.1	31.8
November	31.8	38.0	38.8	...	35.6	39.6	39.5	36.3	...	...	...	...	39.4	35.0
December	39.5	38.0	41.3	...	41.1	41.0	36.5	41.8	...	...	...	...	43.5	42.3
Average ... { 1898	34.6	37.3	38.6	...	37.5	39.1	40.5	37.9	...	...	...	...	39.3	36.3
{ 1897	27.8	30.8	29.0	...	29.5	30.6	26.4	...	...	...	...	...	29.0	26.8
{ 1896	26.2	31.1	27.6	...	28.2	31.5	25.7	...	...	...	...	...	29.4	27.8
BEANS: per bush.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
October	...	...	...	...	50.0	62.5	65.0	...	...	...	...	...	...	...
November	...	...	...	...	50.0	62.5	67.1	...	...	...	...	...	...	...
December	...	...	...	...	67.5	62.5	59.4	...	...	...	...	...	...	...
Average ... { 1898	...	...	...	...	56.7	62.5	64.3	...	...	...	...	...	...	...
{ 1897	...	...	...	...	48.8	62.5	52.1	...	...	...	...	...	...	...
{ 1896	...	...	...	...	87.5	74.8	48.9	...	...	...	...	...	...	...
POTATOES: per bush.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
October	31.8	55.0	36.3	48.8	48.3	55.0	43.4	36.7	...	52.5	49.5	61.3	50.0	40.8
November	31.6	50.0	33.0	48.8	48.3	47.5	48.3	36.8	...	45.0	47.5	50.8	46.8	38.8
December	31.8	48.5	30.0	41.7	48.4	47.5	48.3	33.3	...	45.0	39.4	47.5	43.3	36.8
Average ... { 1898	31.7	51.7	33.3	46.8	48.3	49.5	44.7	35.5	...	47.7	45.0	53.4	47.0	38.8
{ 1897	33.3	31.1	29.2	34.0	47.1	35.6	52.1	...	53.3	36.7	41.4	43.8	32.0	30.0
{ 1896	19.2	43.6	25.1	25.2	27.9	30.4	25.8	...	35.0	20.8	20.9	35.0	30.5	30.0
WOOL: per pound.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
July	15.5	15.5	...	20.0	16.0	15.0	16.4	...	...	...	16.0	16.0	17.0	15.5
August	15.5	15.5	...	20.0	16.0	15.0	16.3	...	...	...	16.0	16.0	17.0	15.5
September	15.5	15.5	...	20.0	16.0	15.0	16.0	...	...	...	16.1	16.0	16.2	15.5
October	15.5	15.5	...	20.0	16.0	15.0	16.0	...	...	...	16.0	15.0	15.0	15.5
November	15.5	15.5	...	20.0	16.0	15.0	15.9	...	...	...	16.0	15.0	15.0	15.5
December	15.5	15.5	...	...	16.0	15.0	15.5	...	...	...	...	15.0	15.0	15.5
Average ... { 1898	15.5	15.5	...	20.0	16.0	15.0	16.0	...	...	...	16.0	15.5	15.9	15.5
{ 1897	19.5	17.8	...	20.0	...	16.1	...	...	16.5	...	18.5	18.0	16.9	18.0
{ 1896	17.9	17.6	17.0	19.2	...	18.7	18.1	...	...	...	18.4	17.0	17.1	18.0
HAY: per ton.	\$ c.	\$	\$ c.	\$ c.	\$	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
July	6 25	6 00	5 50	6 25	5 81	9 50	5 50	6 50	5 50	5 75	6 00	5 81	5 50	...
August	5 80	6 00	4 50	5 50	5 50	9 50	5 50	5 00	5 50	5 75	6 00	5 63	5 50	...
September	6 25	6 00	6 00	5 50	5 50	8 83	5 50	5 00	5 50	5 75	5 70	6 75	5 50	...
October	5 75	6 00	5 88	5 50	5 50	7 50	5 50	5 50	5 50	5 75	5 50	6 13	5 50	...
November	5 75	6 00	6 00	5 50	5 50	7 50	5 50	5 50	5 50	5 75	5 50	6 50	5 50	...
December	5 75	6 00	5 67	5 50	5 53	8 00	5 50	5 50	5 05	4 83	5 75	6 31	5 50	...
Average ... { 1898	5 91	6 00	5 52	5 65	5 55	8 54	5 50	5 48	5 45	5 60	5 74	6 15	5 50	...
{ 1897	6 82	7 42	8 68	7 18	6 22	9 46	5 91	...	5 50	6 20	6 37	7 51	7 37	7.21
{ 1896	8 63	10 51	8 95	11 37	9 19	10 88	6 28	...	8 00	10 73	9 12	12 30	12 88	7.46

PRICES.—Continued.

of Agricultural Products, etc.—Continued.

London.	Orangeville.	Owen Sound.	P. mbroke.	Perth.	Peterborough.	Ridgetown.	St. Thomas.	Simcoe.	Stratford.	Toronto.	Wakerton.	Waterloo.	Whitby.	Woodstock.	The Province.		
															1898.	1897.	1896.
cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
22.5	...	...	...	...	...	22.5	19.6	19.8	21.3	...	...	22.0	...	...	20.6	20.2	20.9
21.4	...	...	...	...	...	22.5	16.3	19.6	...	...	...	22.0	...	...	19.5	19.4	19.8
...	...	...	...	...	...	22.5	17.8	14.5	...	...	...	21.8	...	...	20.1	19.5	17.9
21.7	...	...	...	...	...	22.5	17.7	18.6	21.3	...	...	21.9	...	...	20.1	...	...
18.7	...	...	...	...	...	25.5	16.4	15.7	...	...	...	...	...	...	...	19.7	...
15.9	...	...	...	...	...	...	19.5	22.9	...	...	...	...	...	...	...	...	19.6
...	...	52.5	...	30.0	37.5	...	...	31.4	...	45.0	30.0	...	28.8	...	36.1	30.0	32.5
...	...	36.3	...	40.0	37.5	...	...	43.0	...	45.3	30.0	...	35.7	...	37.5	29.8	31.4
...	43.0	37.5	...	40.0	40.0	...	...	41.0	...	45.4	30.0	...	41.4	...	40.6	30.2	27.9
...	43.0	40.8	...	36.4	38.3	...	...	36.4	...	45.3	30.0	...	35.3	...	38.2	...	...
25.2	...	27.7	...	32.9	28.2	...	...	28.5	...	35.3	37.5	...	31.0	...	...	30.0	...
20.4	...	47.0	...	31.0	28.6	...	...	27.3	...	36.2	...	...	31.1	...	...	...	30.5
...	...	...	95.0	...	...	62.5	70.0	...	...	...	...	...	...	...	67.5	67.7	72.3
...	...	...	95.0	...	...	65.0	70.0	...	...	...	...	...	...	...	69.3	65.5	70.7
...	...	...	95.0	...	...	72.5	79.0	...	...	...	...	...	...	...	72.7	63.0	62.6
...	...	...	95.0	...	...	67.3	73.8	...	...	...	...	...	...	...	70.0	...	...
47.5	...	...	95.0	...	...	56.0	...	50.0	...	83.9	...	...	...	...	...	65.2	...
53.4	...	...	107.1	...	...	47.8	42.5	52.5	...	80.0	...	...	...	...	...	...	68.4
43.8	42.5	38.3	28.3	45.0	47.5	36.8	48.3	...	54.3	44.6	53.3	60.0	48.8	42.7	46.0	38.1	27.8
42.5	41.8	40.8	31.6	45.0	46.8	33.3	47.5	...	54.3	42.8	53.3	60.0	35.0	45.0	43.5	39.1	26.0
43.0	31.6	41.6	36.8	45.0	...	33.4	45.0	...	54.0	43.0	53.3	60.0	35.0	45.0	42.9	42.1	24.5
43.1	38.1	40.5	32.2	45.0	47.0	34.5	46.7	...	54.2	43.4	53.3	60.0	39.2	44.4	44.1	...	...
51.3	30.3	30.5	25.2	27.0	30.0	54.2	59.7	52.3	52.8	36.3	36.7	50.0	32.3	50.0	...	39.9	...
24.5	17.7	18.3	22.6	25.4	30.5	23.3	33.4	25.0	31.6	26.2	21.3	16.6	25.7	25.0	...	...	26.2
16.5	17.0	17.5	19.0	18.0	15.5	16.0	16.0	...	20.0	17.6	18.5	...	16.0	17.5	16.9	18.3	18.4
16.5	17.0	18.5	19.0	18.0	15.5	15.5	16.0	...	20.0	17.1	18.5	...	16.0	17.5	16.8	18.2	18.2
16.5	17.0	17.5	19.0	18.0	15.5	15.5	16.0	...	20.0	16.5	18.5	...	16.0	17.5	16.8	18.4	18.2
16.5	17.0	16.5	19.0	18.0	15.5	15.5	18.0	...	20.0	17.8	...	...	16.0	17.5	16.6	18.3	18.2
16.5	17.0	16.1	19.0	17.0	15.5	15.5	16.0	...	20.0	17.8	...	...	15.6	15.5	16.5	18.7	18.5
16.5	17.0	13.1	19.0	17.0	15.5	17.0	16.0	...	20.0	18.0	...	...	15.0	15.5	16.3	18.7	18.8
16.5	17.0	16.3	19.0	17.6	15.5	15.9	16.0	...	20.0	17.5	18.5	...	15.8	16.8	16.6	...	...
19.6	17.2	17.5	19.0	16.7	18.0	15.8	18.0	...	...	21.8	18.5	...	17.7	17.5	...	18.4	...
18.8	18.3	19.4	19.0	17.2	17.0	18.0	17.9	...	...	20.4	...	...	...	...	...	...	18.4
\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
5.75	5.25	5.41	8.10	...	9.50	5.44	6.25	5.75	6.40	6.88	...	7.00	4.83	6.13	6.28	7.90	9.85
6.63	4.50	4.50	6.30	10.50	9.50	5.25	5.75	5.50	6.40	7.58	...	7.00	4.50	5.00	6.11	7.08	9.76
6.40	4.50	5.05	6.50	10.50	9.50	5.25	5.75	5.50	6.40	7.30	...	7.00	5.75	5.00	6.13	6.97	10.01
6.25	4.50	5.50	6.50	10.50	9.50	6.00	5.75	5.50	6.40	7.16	...	7.00	5.50	5.00	6.21	7.13	9.70
6.50	4.50	5.00	6.60	10.50	9.50	6.00	5.75	5.50	6.40	7.72	...	7.00	5.50	5.94	6.21	7.06	9.41
6.40	4.90	5.50	6.50	10.50	9.50	6.00	6.10	5.50	6.40	7.95	...	7.00	5.50	6.00	6.41	6.92	9.32
6.33	4.72	5.24	6.67	10.53	9.50	5.64	5.89	5.55	6.40	7.44	...	7.00	5.29	5.53	6.22	...	...
6.33	6.02	6.25	10.64	9.52	9.50	5.18	5.65	5.64	5.99	8.79	...	7.53	7.00	6.60	...	7.18	...
7.65	8.27	10.03	10.40	11.78	12.27	6.52	6.65	7.56	8.44	12.93	...	11.00	10.53	8.21	...	...	9.68

VALUES—FALL WHEAT AND SPRING WHEAT.

TABLE X. Showing by County Municipalities and groups of Counties the value at market prices of the total crops of Fall Wheat and Spring Wheat in Ontario in the years 1897 and 1898, with the yearly average for seventeen years, 1882-1898.

Counties.	Fall Wheat.			Spring Wheat.		
	1898.	1897.	1882-98.	1898.	1897.	1882-98.
	\$	\$	\$	\$	\$	\$
Essex	639,262	579,819	520,649	11,655	10,331	15,801
Kent	1,214,229	1,186,607	1,008,518	25,518	20,316	35,627
Elgin	747,720	841,936	716,199	1,794	.....	13,339
Norfolk	679,377	778,859	532,942	1,227	1,484	6,897
Haldimand	422,791	678,767	450,468	13,449	11,018	27,812
Welland	287,963	277,535	280,340	3,173	2,538	10,062
Totals	3,991,342	4,343,523	3,509,116	56,816	45,687	109,538
Lambton	901,581	813,704	631,029	9,645	7,414	52,900
Huron	1,093,493	1,311,902	1,034,134	40,701	51,383	141,191
Bruce	743,592	720,377	677,940	64,341	61,337	127,063
Totals	2,738,666	2,845,983	2,343,103	114,687	120,134	321,154
Grey	594,515	558,804	415,758	147,206	142,908	351,607
Simcoe	1,299,692	1,210,006	963,823	222,049	248,383	363,348
Totals	1,894,207	1,798,810	1,385,581	369,255	391,291	714,955
Middlesex	1,321,372	1,508,441	1,234,334	13,626	7,786	80,152
Oxford	804,504	1,019,853	696,995	9,290	13,113	79,162
Brant	640,014	687,553	469,933	6,947	9,220	11,136
Perth	817,030	1,025,652	729,513	34,172	44,228	115,394
Wellington	428,058	371,627	357,599	116,721	133,488	238,128
Waterloo	722,698	828,526	671,655	2,259	12,174	43,362
Dufferin	167,780	163,552	140,198	158,948	140,244	225,566
Totals	4,901,456	5,605,204	4,300,227	341,963	360,253	792,899
Lincoln	261,541	377,969	305,492	2,373	1,998	17,722
Wentworth	438,344	636,737	457,897	9,876	12,266	26,252
Halton	439,854	610,016	367,817	22,084	26,171	41,334
Peel	460,818	687,792	444,718	182,013	100,753	167,408
York	740,415	876,947	642,134	335,561	260,146	316,631
Ontario	373,755	306,478	180,893	312,459	290,522	536,855
Durham	189,236	137,089	87,587	259,862	246,315	383,219
Northumberland	229,348	147,235	203,383	27,3190	248,159	267,021
Prince Edward	68,331	63,311	48,271	178,279	168,893	69,473
Totals	3,201,142	3,843,574	2,738,192	1,575,697	1,295,223	1,825,915
Lennox and Addington	43,655	30,099	38,288	108,643	67,440	63,761
Frontenac	10,910	11,855	19,549	102,895	88,213	98,304
Leeds	46,533	14,686	.....	73,833	56,881	.....
Grenville	2,777	493	61,250	24,492	16,217	139,739
Dundas	11,350	6,825	13,088	31,260	23,249	57,267
Stormont	5,038	3,886	6,856	41,112	30,668	54,552
Glengarry	1,171	1,486	5,300	67,562	61,729	91,405
Prescott	1,398	2,958	852	78,171	44,051	92,922
Russell	2,080	2,538	2,332	39,817	27,763	45,934
Carleton	6,725	1,683	12,906	300,085	200,252	290,003
Renfrew	4,400	2,900	10,453	476,260	312,749	535,419
Lanark	52,143	11,007	42,928	185,329	115,041	168,006
Totals	188,170	89,816	213,752	1,529,459	1,044,253	1,437,311
Victoria	158,909	28,661	105,218	285,776	222,963	340,488
Peterborough	205,668	67,180	147,120	196,618	154,075	242,960
Haliburton	3,801	2,832	1,941	10,280	7,248	13,438
Hastings	139,254	115,111	144,307	199,452	126,818	154,318
Totals	507,642	213,784	398,586	692,156	511,104	751,204
Muskoka	1,306	1,397	796	9,489	6,816	13,389
Parry Sound	1,068	610	723	9,276	4,912	13,864
Nipissing	153	305	101	7,650	6,510	2,593
Maitoulin	28,469	12,687	11,140	24,694	19,476	.....
Algoma	6,536	2,963	.....	25,517	20,638	79,595
Totals	37,532	17,962	12,760	76,626	58,382	109,441
The Province ..	17,460,147	18,758,656	14,901,317	4,756,659	3,826,327	6,062,417

VALUES—BARLEY AND OATS.

TABLE XI. Showing by County Municipalities and groups of Counties the values at market prices of the total crops of Barley and Oats in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years, 1882-98.

Counties.	Barley.			Oats.		
	1898.	1897.	1882-98.	1898.	1897.	1882-98.
	\$	\$	\$	\$	\$	\$
Essex	74,712	43,332	46,869	414,382	379,205	423,921
Kent	184,677	102,557	102,568	484,878	380,913	465,562
Elgin	71,693	47,975	65,973	408,754	322,749	408,424
Norfolk	23,934	15,321	58,739	225,356	206,856	273,591
Haldimand	45,545	26,419	113,769	259,246	219,623	251,885
Welland	14,602	4,858	32,936	224,047	147,089	201,085
Totals	415,163	240,462	420,854	2,016,663	1,656,435	2,024,158
Lambton	151,289	77,494	164,464	669,875	518,526	565,459
Huron	255,995	155,108	322,370	1,263,836	1,137,401	1,104,209
Bruce	151,658	80,881	202,117	997,741	837,617	785,129
Totals	558,942	313,483	688,951	2,931,452	2,493,544	2,454,797
Grey	188,102	118,168	231,867	1,285,752	1,182,242	1,107,893
Simcoe	265,125	203,621	381,709	1,263,950	788,937	863,587
Totals	453,227	321,789	613,576	2,148,702	1,971,179	1,971,480
Middlesex	184,377	132,888	193,695	921,216	829,000	960,718
Oxford	165,855	90,446	213,368	726,676	641,739	725,790
Brant	70,206	49,804	195,250	191,003	177,276	219,607
Perth	236,268	143,536	234,482	1,021,073	820,062	893,500
Wellington	301,477	179,815	426,355	1,306,028	1,094,549	1,028,704
Waterloo	174,816	110,508	229,208	542,508	479,185	501,658
Dufferin	105,052	69,021	138,864	557,900	562,955	451,452
Totals	1,238,051	776,018	1,631,222	5,266,404	4,599,766	4,781,459
Lincoln	16,383	7,545	39,315	191,848	151,628	194,976
Wentworth	56,475	36,998	138,360	317,589	281,971	341,339
Halton	49,619	39,652	136,411	228,288	203,005	241,285
Peel	183,244	163,621	394,356	428,095	417,070	416,716
York	355,285	264,655	655,381	879,978	885,069	930,790
Ontario	200,913	152,452	432,002	664,618	601,612	682,343
Durham	176,963	162,477	484,507	390,629	378,739	433,615
Northumberland	87,031	77,545	259,012	364,562	338,039	329,633
Prince Edward	83,096	66,712	302,980	132,272	139,291	133,571
Totals	1,209,009	971,657	2,942,324	3,603,879	3,396,424	3,704,268
Lennox and Addington	121,063	83,885	308,279	265,526	231,442	228,548
Frontenac	52,578	27,022	143,562	330,561	272,084	289,755
Leeds	51,095	30,164	111,798	431,478	350,304	712,377
Grenville	22,182	17,469		321,713	266,075	
Dundas	24,478	21,055	72,944	369,469	304,628	355,490
Stormont	26,544	16,028	31,005	299,670	212,276	275,915
Glenarry	35,506	26,124	26,214	357,624	310,102	331,387
Prescott	40,356	21,831	38,418	349,431	302,961	292,429
Russell	33,141	16,037	20,387	225,570	170,454	204,145
Carleton	85,388	51,716	108,761	816,356	614,162	741,708
Renfrew	8,362	4,770	14,840	499,364	407,650	458,694
Lanark	36,063	18,113	35,341	455,445	348,799	423,691
Totals	540,756	334,214	911,549	4,722,107	3,790,937	4,314,140
Victoria	160,350	119,813	317,670	548,184	511,952	509,597
Peterborough	50,161	35,557	115,982	344,989	323,287	346,663
Haliburton	1,633	1,414	2,712	43,679	37,140	46,035
Hastings	154,352	112,487	323,210	463,179	443,667	439,923
Totals	366,496	269,271	759,574	1,400,031	1,316,046	1,342,218
Muskoka	5,275	3,531	6,103	75,425	74,946	91,221
Parry Sound	8,797	5,318	7,684	97,045	92,911	70,974
Nipissing	2,541	2,155	974	38,392	25,038	13,986
Manitoulin	6,163	2,716	9,294	39,329	32,073	75,060
Algoma	7,774	5,266		70,011	58,593	
Totals	30,550	18,936	24,055	320,202	283,566	251,241
The Province	4,812,194	3,245,880	7,992,105	22,409,440	19,507,897	20,843,761

RYE AND PEAS.

TABLE XII. Showing by County Municipalities and groups of Counties the value at market prices of the total crops of Rye and Peas in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years, 1882-98.

Counties.	Rye.			Peas.		
	1898.	1897.	1882-98.	1898.	1897.	1882-98.
	\$	\$	\$	\$	\$	\$
Essex	7,526	13,332	10,330	20,957	15,711	34,959
Kent	7,098	15,097	10,387	38,468	37,840	81,266
Elgin	15,025	25,359	16,192	85,491	67,824	121,245
Norfolk	44,593	72,272	55,968	91,962	80,135	161,711
Haldimand	13,118	15,849	7,898	158,079	88,144	142,499
Welland	19,131	26,237	8,548	57,303	29,378	44,391
Totals	106,491	168,146	109,323	452,260	309,032	586,071
Lambton	5,999	9,341	3,817	93,113	59,053	94,225
Huron	11,498	18,874	5,201	417,793	351,543	467,722
Bruce	24,369	24,143	7,182	612,188	427,252	551,295
Totals	41,866	52,358	16,200	1,123,094	837,848	1,113,242
Grey	25,849	24,874	8,260	563,395	407,433	588,938
Simcoe	45,123	53,831	26,615	457,196	386,876	489,068
Totals	70,972	78,705	34,875	1,020,591	794,309	1,078,006
Middlesex	12,826	19,678	8,715	167,581	156,380	223,934
Oxford	14,582	24,533	13,194	161,315	133,449	190,881
Brant	22,308	40,796	14,196	87,930	67,254	110,904
Perth	4,933	7,281	3,124	308,119	211,247	319,849
Wellington	25,165	43,543	13,671	328,768	228,747	460,999
Waterloo	20,458	31,170	9,654	161,971	139,927	212,828
Dufferin	40,826	39,583	13,127	120,789	106,944	164,470
Totals	141,098	206,984	75,681	1,336,413	1,043,948	1,673,865
Lincoln	11,644	18,131	5,747	60,131	47,178	54,849
Wentworth	18,545	34,507	12,301	111,520	93,158	128,872
Halton	11,206	17,975	6,698	131,175	129,347	133,583
Peel	47,084	55,739	17,170	177,770	185,389	190,286
York	47,605	36,330	17,364	331,774	337,582	397,337
Ontario	68,871	73,101	32,393	252,116	201,404	330,328
Durham	77,713	67,670	43,494	259,852	208,345	290,654
Northumberland	81,917	75,981	80,583	229,265	247,203	248,226
Prince Edward	50,002	42,806	58,337	146,276	144,778	171,278
Totals	414,587	422,240	274,087	1,699,879	1,584,384	1,945,783
Lennox and Addington	32,357	23,925	32,762	96,728	84,603	100,151
Frontenac	23,994	17,971	29,010	53,424	71,360	106,640
Leeds	22,348	24,784	47,929	36,373	35,797	64,487
Grenville	20,510	20,902		11,762	12,344	
Dundas	20,768	19,340	14,986	18,446	12,763	18,837
Stormont	8,089	9,937	4,895	13,399	8,919	24,863
Glengarry	313	90	491	34,335	28,221	48,124
Prescott	954	269	1,777	38,624	22,643	62,509
Russell	171	506	2,639	29,996	19,156	34,151
Carleton	18,135	13,189	42,860	88,982	69,288	140,623
Renfrew	51,333	39,888	63,508	251,137	176,239	250,399
Lanark	19,368	16,193	35,613	95,488	68,631	134,125
Totals	218,290	186,999	276,470	763,694	609,944	984,709
Victoria	29,623	35,236	13,616	177,120	170,123	209,228
Peterborough	42,606	40,534	30,681	157,693	156,844	186,508
Haliburton	3,248	2,858	2,360	14,063	15,001	18,786
Hastings	82,668	72,969	94,969	159,989	165,725	205,781
Totals	158,145	151,597	141,626	505,870	507,693	620,307
Muskoka	1,825	1,997	3,088	18,729	24,207	36,175
Parry Sound	2,787	1,364	3,246	32,491	32,206	24,501
Nipissing	374	151	354	8,864	13,391	6,788
Manitoulin	4,608	2,820	2,622	57,231	46,536	78,240
Algoma	1,814	1,655		36,983	34,548	
Totals	11,408	7,987	9,310	154,298	150,888	149,708
The Province	1,162,857	1,275,016	937,572	7,058,099	5,838,046	8,151,687

VALUES—CORN AND BUCKWHEAT.

TABLE XIII. Showing by County Municipalities and groups of Counties the value at market prices of the total crops of Corn (for husking and silo) and Buckwheat in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years, 1882-98.

Counties.	Corn.					Buckwheat.		
	Husking.	Silo.	Total.			1898.	1897.	1882-98.
			1898.	1897.	1882-98.			
	\$	\$	\$	\$	\$	\$	\$	\$
Essex	981,454	21,040	1,002,494	925,741	752,293	5,668	8,316	7,960
Kent	858,091	35,622	893,713	750,704	618,922	8,277	7,093	8,728
Elgin	427,883	43,366	471,249	499,043	360,420	18,402	17,615	14,382
Norfolk	249,319	73,906	313,225	350,741	284,709	43,885	37,673	39,834
Haldimand	47,639	26,334	73,973	114,244	50,765	6,414	6,493	5,332
Welland	122,428	26,954	149,382	162,147	128,394	15,243	16,976	15,432
Totals	2,676,814	227,222	2,904,036	2,802,620	2,195,703	97,889	94,166	91,668
Lambton	293,924	81,084	375,008	368,361	222,711	8,091	7,526	5,159
Huron	21,159	166,736	187,895	243,913	85,589	13,899	11,172	4,028
Bruce	10,348	126,176	136,524	199,302	51,285	15,084	11,045	4,401
Totals	325,431	373,996	699,427	811,576	359,585	36,574	29,743	13,588
Grey	12,265	144,636	156,901	277,772	62,465	37,405	28,007	8,048
Simcoe	20,194	100,050	120,244	158,738	55,060	56,809	59,734	18,475
Totals	32,459	244,686	277,145	436,510	117,525	94,214	87,741	26,523
Middlesex	304,034	162,042	466,076	518,931	318,652	12,878	8,007	6,487
Oxford	172,360	178,648	351,008	420,408	226,691	8,048	7,095	5,708
Brant	93,596	43,062	136,658	185,336	113,600	3,992	4,811	5,150
Perth	7,146	179,774	186,920	215,663	67,217	3,790	4,219	1,602
Wellington	3,950	127,626	131,576	167,125	49,615	18,250	11,395	3,684
Waterloo	17,270	65,318	82,588	109,932	43,942	4,202	1,688	1,232
Dufferin	1,045	16,074	17,119	37,571	7,524	13,724	13,230	3,176
Totals	599,401	772,544	1,371,945	1,654,866	827,241	64,884	50,445	27,039
Lincoln	111,541	32,382	143,923	198,573	130,585	2,843	4,566	5,524
Wentworth	62,560	87,738	150,298	187,784	121,077	8,493	8,462	7,138
Halton	11,998	48,400	60,398	124,548	45,267	1,871	2,171	1,501
Peel	8,331	57,750	66,081	123,027	34,953	3,977	8,201	2,392
York	20,385	173,676	194,061	264,322	76,961	18,772	22,729	8,022
Ontario	34,572	181,388	215,960	196,097	79,417	37,000	44,487	22,839
Durham	24,062	80,104	104,166	128,019	54,864	30,366	53,408	39,116
Northumberland	55,966	101,714	157,680	219,574	107,121	58,263	92,545	81,624
Prince Edward	77,784	54,564	132,348	238,225	119,272	53,163	79,705	71,124
Totals	407,199	767,716	1,174,915	1,680,169	769,517	224,238	316,274	239,280
Lennox and Add.	60,737	44,056	104,813	140,718	66,616	38,847	44,607	35,403
Frontenac	50,070	117,392	167,462	219,079	72,427	19,620	17,210	16,912
Leeds	109,065	197,842	306,907	340,418	247,850	29,645	30,178	49,585
Grenville	58,012	130,508	188,520	229,279	91,381	23,092	39,099	16,897
Dundas	69,335	157,332	226,667	266,126	91,381	13,029	22,868	20,240
Stormont	50,232	118,828	169,060	201,145	65,580	20,112	25,575	10,995
Glengarry	15,745	174,790	190,535	219,474	65,930	12,774	14,723	12,484
Prescott	45,823	61,894	107,717	94,821	49,470	9,952	10,824	9,113
Russell	16,420	52,558	68,978	57,841	26,384	5,629	9,418	34,341
Carleton	41,080	192,095	233,175	228,722	83,297	37,511	49,756	17,544
Renfrew	10,539	100,458	110,997	80,142	28,742	24,607	17,544	41,591
Lanark	24,265	198,694	222,959	185,230	67,730	38,101	40,458	261,660
Totals	551,403	1,546,448	2,097,851	2,253,025	865,407	272,899	322,310	18,263
Victoria	4,060	60,854	64,914	67,609	21,197	26,455	48,389	14,672
Peterborough	5,732	74,798	80,530	103,241	26,536	23,661	28,212	3,794
Haliburton	1,315	5,612	6,927	8,146	2,645	3,637	2,685	44,309
Hastings	101,867	156,918	258,785	353,178	159,524	53,266	50,769	79,929
Totals	112,974	298,102	411,156	532,224	209,902	107,019	131,164	3,043
Muskoka	2,236	8,918	11,154	10,759	4,073	2,497	2,458	1,332
Parry Sound	1,777	4,888	6,665	5,477	1,832	2,553	1,737	505
Nipissing	514	1,040	1,554	1,542	484	714	789	1,588
Manitoulin	1,327	8,542	9,869	5,850	2,601	2,200	1,260	
Algoma	426	1,954	2,410	4,034	2,601	1,051	1,69	
Totals	6,280	25,352	31,632	27,462	8,990	9,015	7,413	6,463
The Province	4,711,961	4,256,146	8,968,107	9,184,452	5,353,870	906,732	1,039,256	746,155

VALUES—BEANS AND POTATOES.

TABLE XIV. Showing by County Municipalities and groups of Counties the value at market prices of the total crops of Beans and Potatoes in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98.

Counties	Beans.			Potatoes.		
	1898.	1897.	1882-98.	1898.	1897.	1882-98.
	\$	\$	\$	\$	\$	\$
Essex	3,315	6,512	13,435	169,743	139,790	117,880
Kent	337,900	370,188	362,615	159,191	95,276	158,658
Elgin	43,476	61,078	47,349	143,245	77,131	118,526
Norfolk	8,785	10,847	11,387	125,650	93,625	137,274
Haldimand	1,863	3,725	3,859	49,234	32,418	57,076
Welland	8,489	11,555	13,532	85,101	36,341	90,788
Totals	403,828	463,905	452,177	732,164	474,581	680,202
Lambton	14,287	24,727	15,492	176,514	93,331	122,713
Huron	2,747	5,124	3,229	163,537	181,489	247,138
Bruce	1,680	2,828	2,327	142,132	180,651	213,993
Totals	18,714	32,679	21,048	482,183	455,471	583,844
Grey	3,490	4,327	4,078	294,259	272,403	339,154
Simcoe	7,951	10,467	4,826	390,027	324,435	374,986
Totals	11,441	14,794	8,904	624,286	596,838	714,140
Middlesex	10,518	16,338	14,341	275,790	166,632	245,513
Oxford	4,648	4,752	5,828	141,265	101,711	144,166
Brant	3,600	7,247	5,923	93,746	80,389	100,024
Perth	1,617	535	1,418	146,027	124,693	176,566
Wellington	809	608	750	191,556	206,650	298,458
Waterloo	294	795	773	116,093	112,123	143,013
Dufferin	2,430	2,184	822	113,669	197,839	188,380
Totals	23,966	32,459	29,855	1,078,146	990,037	1,296,120
Lincoln	1,050	1,112	3,106	84,275	65,270	74,721
Wentworth	1,250	2,726	2,893	168,235	125,363	174,257
Halton	353	464	735	50,634	59,396	70,197
Peel	1,814	3,654	1,396	133,867	174,583	137,631
York	3,737	4,176	4,540	272,374	297,371	328,363
Ontario	5,936	3,776	6,553	220,994	201,541	222,681
Durham	1,588	6,545	7,737	144,239	125,693	161,976
Northumberland	3,032	7,452	14,756	167,714	173,862	197,795
Prince Edward	3,436	4,929	9,011	62,403	63,286	84,965
Totals	22,196	34,844	50,327	1,304,735	1,286,905	1,452,586
Lennox and Addington	3,892	2,901	4,746	113,318	122,936	141,847
Frontenac	4,032	5,904	6,181	150,182	149,944	164,851
Leeds	3,754	2,591	7,751	81,088	169,822	336,045
Grenville	1,216	1,737	97,024	97,024	160,431	91,225
Dundas	2,523	3,237	5,446	96,521	106,453	128,109
Stormont	2,029	4,805	4,187	42,172	72,089	91,225
Glengarry	1,792	1,752	3,733	37,459	114,251	106,800
Prescott	2,964	4,842	11,324	135,612	107,055	122,594
Russell	2,410	2,999	4,204	94,962	66,474	66,773
Carleton	6,350	8,690	10,605	291,067	269,924	308,471
Renfrew	5,418	5,181	10,512	195,042	198,319	232,249
Lanark	3,136	3,614	5,283	116,071	191,781	196,540
Totals	39,016	48,253	73,972	1,500,518	1,729,479	1,895,504
Victoria	1,838	2,268	2,709	108,909	155,603	160,539
Peterborough	1,582	1,800	2,423	101,309	181,963	138,693
Haliburton	364	561	590	9,838	30,790	26,035
Hastings	5,522	6,522	7,961	186,011	226,569	264,678
Totals	9,306	11,151	13,683	406,067	594,925	599,945
Muskoka	1,442	575	847	50,239	82,535	73,095
Parry Sound	420	443	433	50,833	79,898	59,409
Nipissing	231	310	229	20,933	39,401	18,307
Manitoulin	770	170	497	29,101	40,625	65,540
Algoma	430	251	52,899	52,899	53,523	53,523
Totals	3,293	1,749	2,006	204,055	295,982	213,351
The Province	531,760	639,834	651,972	6,332,154	6,424,218	7,435,692

VALUES—MANGEL-WURZELS AND CARROTS.

TABLE XV. Showing by County Municipalities and groups of Counties the value at market prices of the total crops of Mangel-wurzels and Carrots in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98.

Counties.	Mangel-wurzels.			Carrots.		
	1898.	1897.	1882-98.	1898.	1897.	1882-98.
	\$	\$	\$	\$	\$	\$
Essex	15,677	17,558	10,723	5,245	8,092	4,315
Kent	23,950	19,183	13,569	11,578	8,979	7,127
Elgin	40,910	34,296	17,231	12,638	12,319	9,573
Norfolk	23,918	18,066	10,028	16,041	13,338	8,010
Haldimand	15,727	7,933	5,753	5,805	5,810	3,363
Welland	7,777	5,194	4,864	4,188	3,014	3,012
Totals	127,959	102,230	62,168	55,495	51,552	35,400
Lambton	57,063	34,165	21,652	14,326	15,174	11,131
Huron	149,326	133,251	81,727	17,018	17,192	21,756
Bruce	51,270	47,685	21,769	16,565	16,428	13,563
Totals	257,659	215,101	125,148	47,909	48,794	46,450
Grey	46,284	32,782	17,468	19,266	13,325	21,463
Simcoe	40,177	30,669	22,520	21,219	20,088	24,898
Totals	86,461	63,451	39,988	40,485	33,413	46,361
Middlesex	129,999	99,658	65,402	33,440	44,240	26,666
Oxford	136,125	85,582	60,009	13,265	13,520	16,509
Brant	42,671	30,973	18,672	4,588	7,054	9,354
Perth	164,206	124,155	85,921	12,750	14,678	17,306
Wellington	89,872	91,949	49,670	10,684	12,772	13,604
Waterloo	52,696	38,554	21,737	15,489	14,910	16,385
Dufferin	8,023	6,342	5,009	4,375	5,139	5,750
Totals	623,492	477,263	306,420	94,591	112,313	105,574
Lincoln	12,060	12,570	8,411	6,721	8,835	5,287
Wentworth	60,534	45,801	23,894	17,020	16,808	11,249
Halton	39,077	39,522	20,656	5,537	5,543	5,140
Peel	35,992	42,973	19,668	16,026	22,491	13,285
York	105,911	101,291	69,094	23,550	22,336	29,123
Ontario	62,474	53,680	33,064	8,258	6,284	17,683
Durham	39,209	30,518	20,536	12,383	14,386	13,712
Northumberland	29,419	28,860	18,816	19,125	14,293	12,556
Prince Edward	5,376	4,584	4,216	2,414	2,852	2,107
Totals	396,152	359,799	218,355	111,034	113,878	115,142
Lennox and Addington	5,737	3,516	3,688	2,845	3,067	2,418
Frontenac	14,280	11,470	6,691	11,201	9,757	6,430
Leeds	21,142	12,894	12,109	10,059	6,748	10,984
Grenville	12,744	10,331	12,109	13,487	12,049	10,984
Dundas	9,454	9,124	5,137	13,500	11,849	6,854
Stormont	6,737	7,296	2,632	7,050	8,029	3,884
Glengarry	13,586	11,553	4,228	12,557	16,090	5,121
Prescott	4,483	3,778	2,851	9,880	7,355	3,398
Russell	9,553	7,605	5,398	7,310	11,853	7,718
Carleton	37,376	38,568	20,851	18,813	18,957	20,426
Renfrew	13,555	7,560	4,919	10,350	5,584	5,613
Lanark	20,917	11,891	7,359	11,022	7,880	7,650
Totals	169,564	135,586	75,893	128,074	119,218	80,496
Victoria	45,608	46,537	30,129	6,372	7,719	12,338
Peterborough	24,613	21,094	11,926	23,718	27,028	17,058
Haliburton	352	963	352	863	742	942
Hastings	19,219	19,725	14,784	16,271	20,836	9,823
Totals	89,792	88,319	57,191	47,224	56,325	40,161
Muskoka	1,300	1,901	1,180	4,380	7,119	3,815
Parry Sound	946	1,189	469	3,583	4,043	2,317
Nipissing	1,696	1,080	249	937	750	281
Manitoulin	784	1,464	1,024	2,125	3,413	2,354
Algoma	800	888	3,396	3,396	3,386	
Totals	5,526	6,522	2,922	14,421	18,711	8,767
The Province	1,756,605	1,448,271	888,085	539,233	554,204	478,351

VALUES—TURNIPS AND HAY AND CLOVER.

TABLE XVI. Showing by County Municipalities and groups of Counties the value at market prices of the total crops of Turnips and Hay and Clover in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98.

Counties.	Turnips.			Hay and clover.		
	1898.	1897.	1882-98.	1898.	1897.	1882-98.
	\$	\$	\$	\$	\$	\$
Essex	9,614	8,641	6,976	530,193	597,455	586,611
Kent	9,181	6,341	11,999	693,773	878,523	791,447
Elgin	20,431	17,263	16,442	639,646	869,383	749,690
Norfolk	42,874	53,874	49,491	404,300	462,973	504,258
Haldimand	7,728	8,634	4,448	597,953	720,377	606,382
Welland	6,000	7,366	6,637	559,775	618,629	615,682
Totals.....	95,828	102,089	95,993	3,425,640	4,147,340	3,853,470
Lambton	19,724	18,189	14,647	741,978	1,020,544	880,185
Huron	365,994	377,212	310,295	1,229,992	1,530,345	1,340,242
Bruce	386,642	384,655	288,554	1,051,087	1,270,479	1,083,657
Totals.....	772,360	780,056	613,496	3,023,057	3,821,368	3,254,084
Grey	518,196	492,231	426,569	1,271,698	1,418,423	1,409,211
Simcoe	376,662	382,468	221,705	919,465	1,038,508	1,040,556
Totals.....	894,858	874,699	648,274	2,191,163	2,456,931	2,449,767
Middlesex	143,442	129,992	85,268	1,160,739	1,416,643	1,356,125
Oxford	381,010	375,488	293,463	780,150	1,004,302	938,274
Brant	164,710	219,420	156,132	364,176	419,894	425,179
Perth	285,743	251,552	217,299	845,055	1,144,671	1,010,509
Wellington	677,153	656,484	609,405	1,035,717	1,187,005	1,205,922
Waterloo	253,780	258,675	225,930	478,828	557,728	589,889
Dufferin.....	223,360	223,323	138,543	369,201	436,694	437,569
Totals.....	2,129,188	2,114,934	1,726,040	5,033,865	6,166,837	5,963,467
Lincoln	16,519	18,858	10,681	457,288	520,069	518,626
Wentworth.....	127,642	167,923	133,195	506,625	509,536	593,414
Halton	102,778	119,501	87,760	341,049	367,501	416,862
Peel	85,027	118,619	69,964	414,196	345,573	493,316
York	293,239	349,736	197,364	843,842	753,570	981,504
Ontario	573,495	591,987	554,202	755,774	730,809	748,576
Durham	259,149	360,488	267,147	585,613	430,951	576,811
Northumberland.....	190,767	276,953	169,599	672,245	411,113	639,263
Prince Edward.....	5,945	5,929	4,173	353,315	265,832	362,540
Totals.....	1,654,561	2,009,994	1,496,085	4,929,947	4,834,954	5,330,913
Lennox and Addington.....	4,135	3,391	4,059	507,757	446,136	594,968
Frontenac.....	26,643	24,128	14,732	714,025	706,613	738,753
Leeds	42,735	35,376	18,993	613,547	531,018	1,322,412
Grenville	6,659	7,346	416,385	416,385	332,326	332,326
Dundas	8,633	8,580	3,981	429,124	350,147	534,211
Stormont.....	5,121	3,602	2,972	333,025	300,756	473,675
Glengarry	11,172	13,773	5,168	522,611	339,643	578,159
Prescott.....	10,008	8,991	6,861	504,611	259,119	525,546
Russell	49,412	39,192	21,081	267,958	161,744	277,506
Carleton	92,568	91,458	67,906	768,077	386,191	848,637
Renfrew.....	50,792	44,190	27,724	734,184	465,557	715,435
Lanark	64,368	55,188	28,780	481,048	325,807	778,161
Totals.....	372,246	335,225	202,257	6,292,382	4,595,057	7,387,463
Victoria	213,521	212,421	162,529	494,111	271,957	465,912
Peterborough.....	117,524	148,356	78,191	416,062	250,144	408,823
Haliburton	7,312	10,306	8,985	90,308	97,504	105,890
Hastings	101,916	121,347	51,399	752,576	578,098	809,975
Totals.....	440,273	492,430	301,104	1,753,057	1,197,703	1,790,600
Muskoka	26,749	27,191	29,252	224,629	219,493	250,870
Parry Sound.....	42,626	46,894	27,985	192,335	171,078	150,267
Nipissing.....	11,200	5,895	3,336	72,929	45,693	35,492
Manitoulin.....	13,312	15,951	23,007	95,695	86,404	188,439
Algoma	19,587	24,357	127,473	127,473	123,841	123,841
Totals.....	113,474	120,288	83,580	713,061	646,509	625,068
The Province.....	6,472,788	6,829,715	5,166,829	27,362,172	27,366,699	30,654,832

VALUES—ALL FIELD CROPS AND WOOL.

TABLE XVII. Showing by County Municipalities and groups of Counties the aggregate value, at market prices, of all field crops in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98; also the values, at market prices, of the total clip of wool in 1897 and 1898, with the yearly average for the seventeen years 1882-98.

Counties.	All field crops.			Wool.		
	1898.	1897.	1882-98.	1898.	1897.	1882-98.
	\$	\$	\$	\$	\$	\$
Essex	2,910,443	2,753,835	2,552,722	14,308	16,974	15,862
Kent	4,092,431	3,879,617	3,676,983	26,648	27,193	23,240
Elgin	2,720,474	2,883,971	2,674,985	25,865	25,596	26,329
Norfolk	2,045,127	2,196,064	2,134,839	13,886	15,570	17,328
Halimand	1,670,925	1,939,484	1,731,009	14,783	15,389	18,957
Welland	1,442,174	1,348,797	1,455,303	9,006	10,381	12,560
Totals	14,881,574	15,001,768	14,225,841	104,496	111,103	114,276
Lambton	3,238,493	3,067,549	2,755,584	24,540	29,479	29,383
Huron	5,213,224	5,525,909	5,168,831	41,624	46,904	53,391
Bruce	4,394,873	4,264,680	4,030,275	47,791	51,887	55,446
Totals	12,846,590	12,858,138	11,954,690	113,955	128,270	138,220
Grey	5,092,318	4,973,699	4,992,779	55,592	61,397	74,702
Simcoe	5,084,689	4,946,761	4,857,176	50,385	60,873	51,999
Totals	10,177,007	9,920,460	9,849,955	105,977	122,270	126,701
Middlesex	4,853,880	5,054,614	4,820,032	37,297	39,292	43,057
Oxford	3,697,741	3,936,391	3,610,038	11,786	12,001	18,072
Brant	1,832,598	1,981,927	1,855,059	9,012	9,479	13,275
Perth	4,067,703	4,132,172	3,873,700	21,215	24,285	32,015
Wellington	4,661,774	4,385,807	4,756,564	43,760	49,108	51,420
Waterloo	2,628,580	2,695,895	2,701,266	12,863	13,825	20,767
Dufferin	1,903,186	2,004,521	1,920,450	18,682	20,865	19,991
Totals	23,645,462	24,191,327	23,537,109	154,615	168,855	198,597
Lincoln	1,271,599	1,434,302	1,375,042	7,600	9,334	10,318
Wentworth	1,992,546	2,160,040	2,174,138	11,779	11,501	15,654
Halton	1,482,923	1,745,352	1,575,547	11,532	12,462	13,617
Peel	2,234,004	2,449,495	2,403,259	11,209	14,082	18,375
York	4,446,104	4,476,310	4,654,608	24,011	29,496	30,814
Ontario	3,713,623	3,454,230	3,879,439	28,360	29,633	30,951
Durham	2,530,958	2,350,643	2,869,975	21,466	21,683	23,390
Northumberland	2,573,558	2,348,814	2,729,448	15,845	18,887	21,111
Prince Edward	1,276,656	1,231,133	1,441,318	4,286	5,450	8,162
Totals	21,521,971	21,650,319	23,102,774	136,088	152,528	172,392
Lennox and Addington	1,448,796	1,288,696	1,625,484	10,012	9,548	13,427
Frontenac	1,681,807	1,632,120	1,713,797	12,193	15,079	16,458
Leeds	1,770,527	1,641,661	1,575,547	9,130	11,623	23,339
Grenville	1,162,603	1,126,098	3,143,309	5,608	6,583	8,369
Dundas	1,279,242	1,156,244	1,324,628	5,397	6,300	8,661
Stormont	979,108	905,011	1,062,332	5,296	6,729	12,563
Glengarry	1,348,897	1,159,011	1,283,055	9,383	10,367	9,794
Prescott	1,294,191	891,498	1,223,435	7,639	8,425	7,543
Russell	830,987	593,630	727,765	7,106	6,658	22,209
Carleton	2,800,609	2,042,456	2,731,305	18,109	22,209	33,076
Renfrew	2,435,801	1,758,253	2,172,606	29,349	30,927	30,580
Lanark	1,801,458	1,399,638	1,972,777	24,585	29,562	194,005
Totals	18,834,026	15,594,316	18,980,583	143,707	164,010	24,156
Victoria	2,321,690	1,901,251	2,369,433	23,777	26,629	16,274
Peterborough	1,786,764	1,539,315	1,768,236	13,116	14,657	3,729
Haliburton	196,310	219,349	243,396	4,443	4,800	22,155
Hastings	2,592,460	2,413,821	2,724,961	16,238	18,918	66,344
Totals	6,897,224	6,073,736	7,106,026	57,574	65,004	7,029
Muskoka	434,439	464,955	516,951	8,340	9,553	5,129
Parry Sound	451,425	447,880	369,036	8,922	9,242	1,451
Nipissing	168,198	143,010	80,679	813	1,220	7,667
Manitoulin	314,350	271,445	541,001	8,624	9,088	
Algoma	356,681	335,117	4,267	4,267	4,614	
Totals	1,725,093	1,662,407	1,507,667	30,966	33,717	20,276
The Province	110,528,947	106,952,471	110,264,645	847,378	945,757	1,030,811

VALUE PER ACRE—FALL WHEAT, SPRING WHEAT, BARLEY.

TABLE XVIII. Showing by County Municipalities and groups of Counties the market value of crops per acre, of Wheat and Barley in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98.

Counties.	Fall wheat.			Spring wheat.			Barley.		
	1898.	1897.	1882-98.	1898.	1897.	1882-98.	1898.	1897.	1882-98.
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Essex	16 73	17 83	16 06	10 24	12 18	12 45	10 60	7 06	11 73
Kent	16 38	17 60	16 30	11 69	10 85	12 74	12 54	7 83	12 62
Elgin	16 24	19 71	16 48	11 28	.....	12 70	12 46	7 24	12 27
Norfolk	15 06	20 18	15 21	7 82	9 83	11 71	9 39	6 32	12 60
Haldimand	12 42	18 53	13 40	9 00	10 45	10 74	8 89	4 86	10 92
Welland	14 64	15 17	13 28	8 79	10 53	11 36	9 35	5 62	11 70
Group	15 52	18 39	15 42	10 35	10 96	11 93	11 29	6 95	11 89
Lambton	16 59	15 95	16 00	10 45	11 08	12 06	11 40	6 59	12 38
Huron	16 79	22 13	17 15	11 63	11 63	11 79	11 86	7 67	13 41
Bruce	17 84	19 78	16 54	12 11	10 27	11 68	12 12	7 43	13 01
Group	16 99	19 40	16 65	11 78	10 88	11 79	11 80	7 31	13 03
Grey	17 35	20 18	16 81	11 00	9 59	12 18	10 49	7 13	12 17
Simcoe	18 39	19 71	17 88	11 07	12 26	12 66	10 56	7 24	12 47
Group	18 05	19 85	17 55	11 04	11 13	12 42	10 53	7 20	12 35
Middlesex	16 59	19 86	17 08	12 39	12 50	12 37	11 25	7 96	12 67
Oxford	16 79	23 77	17 32	11 83	14 07	13 52	11 93	6 43	14 24
Brant	17 56	22 13	16 22	9 90	14 78	11 42	9 80	6 78	12 83
Perth	17 14	23 15	17 53	13 29	12 50	12 80	12 43	7 64	14 16
Wellington	18 04	21 43	17 59	11 07	8 17	12 22	11 89	7 56	13 62
Waterloo	17 14	20 57	17 37	10 66	13 91	12 64	11 93	7 70	14 21
Dufferin	15 27	17 91	16 74	9 96	8 25	12 06	10 15	7 26	12 31
Group	16 99	21 48	17 17	10 73	9 03	12 40	11 59	7 42	13 51
Lincoln	13 67	19 71	14 93	9 27	12 89	11 78	8 44	5 91	12 21
Wentworth	14 50	22 83	15 68	8 58	11 16	12 15	10 41	7 24	13 81
Halton	15 96	23 54	16 50	9 02	12 97	12 23	10 37	7 18	13 66
Peel	15 55	21 58	17 35	11 76	11 87	13 50	10 33	7 56	13 14
York	18 60	21 58	18 38	13 29	15 33	14 00	11 78	8 18	14 01
Ontario	19 43	17 75	18 47	12 46	13 13	13 67	11 13	7 48	13 62
Durham	16 38	14 47	16 35	10 80	13 36	13 29	10 22	7 21	12 86
Northumberland	17 91	12 04	16 00	10 17	13 36	11 43	9 20	6 64	11 30
Prince Edward	15 61	13 76	14 26	11 35	12 65	11 45	8 66	5 83	10 49
Group	16 48	20 33	16 72	11 57	13 43	13 08	10 64	7 36	12 76
Lennox and Addington	16 93	11 73	14 51	12 53	12 03	12 02	9 04	6 49	11 34
Frontenac	13 67	12 90	16 24	10 73	11 48	12 38	9 23	6 08	11 98
Leeds	16 03	9 38	.....	13 63	10 85	.....	10 07	6 43	.....
Grenville	16 93	11 74	15 78	15 02	10 77	13 08	11 93	7 05	12 03
Dundas	19 50	11 03	17 04	13 77	11 16	15 16	12 54	7 40	14 85
Stormont	16 79	13 22	16 44	14 26	10 69	14 36	11 13	6 99	12 74
Glengarry	15 61	9 23	15 23	12 25	12 03	13 29	10 87	7 80	11 00
Prescott	13 19	15 25	12 53	13 49	9 98	13 04	11 21	6 97	12 02
Russell	18 74	16 27	16 90	13 70	12 81	14 05	11 06	7 18	11 38
Carleton	20 32	17 59	14 78	16 19	13 44	14 75	12 35	7 34	13 66
Renfrew	13 88	14 08	16 59	14 88	11 87	13 50	8 06	5 51	11 19
Lanark	18 32	14 08	16 96	14 32	11 40	12 64	11 17	6 70	12 21
Group	16 95	11 89	15 84	14 14	11 86	13 49	10 46	6 82	12 09
Victoria	18 11	14 86	17 13	.....	12 10	12 44	10 46	6 51	12 34
Peterborough	18 46	13 69	16 45	11 69	11 24	11 09	9 65	6 24	12 02
Haliburton	13 67	11 65	13 57	8 72	8 33	10 52	6 23	5 05	10 94
Hastings	16 24	10 86	15 27	12 11	12 10	12 48	10 03	6 88	11 59
Group	17 65	12 10	16 15	11 89	11 76	11 94	10 13	6 61	11 96
Muskoka	12 56	15 02	14 47	11 49	10 22	12 50	8 36	5 10	9 66
Parry Sound	12 42	15 25	12 68	12 11	11 32	13 17	9 35	5 62	10 41
Nipissing	13 96	7 82	11 22	11 42	13 20	12 00	8 17	7 56	9 02
Mant ulin	17 62	12 51	.....	12 63	10 22	.....	9 96	6 35	.....
Algoma	19 22	11 57	17 06	13 08	13 68	15 68	10 07	7 26	11 43
Group	17 41	12 46	16 49	12 43	11 65	14 76	9 33	6 17	10 50
The Province	16 66	19 74	16 55	12 22	11 84	12 78	10 97	7 19	12 68

VALUE PER ACRE—OATS, RYE AND PEAS.

TABLE XIX. Showing by County Municipalities and groups of Counties the market value of crops per acre of Oats, Rye and Peas in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98.

Counties.	Oats.			Rye.			Peas.		
	1898.	1897.	1882-98.	1898.	1897.	1882-98.	1898.	1897.	1882-98.
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Essex	9 24	8 07	11 59	10 05	7 73	9 57	10 02	8 25	10 98
Kent	10 53	8 50	12 42	8 05	7 07	9 57	9 14	7 37	10 91
Elgin	10 04	7 80	11 63	8 05	7 09	8 46	8 35	5 64	10 16
Norfolk	7 38	6 26	9 77	5 44	5 84	7 01	5 53	4 72	9 93
Halldmand	8 46	6 49	9 76	6 66	7 20	8 18	7 62	4 55	9 23
Welland	9 24	6 24	9 66	6 31	6 75	7 51	8 14	4 04	8 96
Group	9 29	7 40	11 01	6 38	6 49	7 72	7 42	5 07	9 89
Lambton	10 22	7 62	11 25	8 31	7 50	8 48	9 66	5 22	10 13
Huron	10 14	9 02	11 76	7 74	8 44	8 67	8 20	6 69	12 10
Bruce	9 86	8 14	10 54	8 31	7 54	8 49	10 34	7 16	12 57
Group	10 06	8 39	11 23	8 15	7 84	8 54	9 37	6 78	12 13
Grey	8 98	8 20	10 26	7 44	7 84	8 39	8 82	6 19	11 68
Simcoe	8 95	7 89	10 99	6 92	6 37	8 57	7 62	6 32	11 74
Group	8 97	8 07	10 57	7 10	6 77	8 52	8 24	6 25	11 71
Middlesex	10 37	8 75	11 94	9 14	7 62	8 53	8 56	7 07	10 85
Oxford	10 45	8 81	12 26	8 44	7 62	8 08	8 98	7 07	11 51
Brant	8 28	6 73	10 92	6 44	7 39	7 41	6 73	4 76	10 11
Perth	11 53	9 38	12 91	8 70	7 88	8 85	9 55	6 36	12 33
Wellington	10 27	8 81	11 59	8 35	7 92	8 51	8 25	5 64	12 16
Waterloo	9 91	8 59	11 66	8 13	7 99	8 53	7 83	6 74	12 06
Dufferin	8 98	8 83	10 88	8 48	7 95	8 52	5 69	4 76	10 84
Group	10 24	8 78	11 89	8 06	7 76	8 22	8 12	6 06	11 62
Lincoln	8 75	6 78	10 12	6 69	7 73	7 73	7 62	5 85	9 53
Wentworth	8 93	7 80	11 16	7 00	8 94	8 59	7 31	6 15	10 55
Halton	8 85	7 82	11 13	6 09	7 54	8 24	7 88	8 08	11 34
Peel	9 55	8 77	11 64	8 83	8 33	9 69	7 46	7 70	10 98
York	10 42	9 36	12 47	7 13	7 77	8 66	8 20	7 66	11 83
Ontario	9 73	8 38	11 78	7 31	6 86	8 43	7 93	6 23	11 22
Durham	8 95	8 14	11 10	6 48	6 26	7 65	8 67	6 40	10 87
Northumberland	8 10	7 35	9 38	6 00	5 35	7 09	6 63	6 65	9 62
Prince Edward	7 30	6 71	8 81	5 92	6 30	7 59	7 41	5 73	9 65
Group	9 28	8 25	11 25	6 70	6 76	7 75	7 72	6 80	10 79
Lennox and Addington	7 82	6 78	8 91	7 22	6 41	8 18	7 36	6 53	9 96
Frontenac	7 71	6 24	9 01	6 00	5 35	8 98	5 85	6 78	10 10
Leeds	8 59	7 23	9 96	7 40	6 52	9 50	8 61	7 87	10 92
Grenville	9 24	7 53	10 66	7 66	5 62	10 60	10 60	8 42	12 57
Dundas	9 68	8 25	11 28	8 44	7 54	11 60	12 37	8 08	12 57
Stormont	10 17	7 57	10 98	8 70	8 63	10 48	10 07	6 95	11 68
Glengarry	9 37	8 23	10 27	6 52	7 50	9 26	8 35	8 84	10 30
Prescott	9 55	8 16	9 91	6 96	4 98	9 98	10 13	6 65	9 90
Russell	9 73	7 68	10 39	6 11	8 30	11 28	10 96	8 42	11 31
Carleton	10 35	7 73	11 25	7 79	6 37	10 08	12 32	8 42	12 40
Renfrew	9 00	7 16	10 13	7 57	5 84	9 93	9 60	7 07	11 36
Lanark	9 31	7 30	10 29	7 96	6 22	10 62	9 55	6 95	11 87
Group	9 24	7 47	10 28	7 44	6 24	9 70	9 09	7 24	11 09
Victoria	9 05	7 75	10 47	6 70	7 05	8 20	7 46	6 86	11 00
Peterborough	7 79	6 87	9 65	6 87	6 37	7 94	7 36	7 29	10 62
Haliburton	5 91	4 99	8 34	6 66	6 15	8 71	5 79	5 60	9 70
Hastings	7 79	7 34	9 27	6 87	6 33	8 45	6 32	6 15	9 81
Group	8 16	7 27	9 76	6 84	6 49	8 32	6 98	6 68	10 43
Muskoka	6 19	6 01	9 11	6 79	6 48	9 99	4 91	6 06	10 99
Parry Sound	6 79	6 89	8 91	7 09	6 26	11 35	6 99	7 58	11 13
Nipissing	9 80	6 15	8 99	8 70	7 19	9 57	5 22	6 74	9 59
Manitoulin	8 62	5 94	10 22	9 70	6 86	9 30	9 76	7 87	13 42
Algoma	8 26	7 55	10 22	9 70	7 01	9 30	10 13	9 89	13 42
Group	7 37	6 57	9 35	8 35	6 69	10 19	7 84	7 69	12 08
The Province	9 43	8 02	10 94	7 04	6 79	8 43	8 15	6 51	11 19

VALUE PER ACRE—CORN, BUCKWHEAT AND BEANS.

TABLE XX. Showing by County Municipalities and groups of Counties the market value of crops per acre of Corn (for husking and silo and the average for the two), Buckwheat and Beans in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98.

Counties.	Corn.										Buckwheat.			Beans.		
	Husk- ing.	Silo.	Average.													
			1898.	1897.	1882-98.	1898.	1897.	1882-98.	1898.	1897.	1882-98.					
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	
Essex	17 35	12 34	17 20	15 42	19 02	8 25	6 75	8 07	11 20	11 67	18 82					
Kent	17 93	12 80	17 65	15 97	19 15	6 99	5 52	7 56	11 76	12 78	16 59					
Elgin	16 70	18 62	16 86	17 17	19 15	7 11	6 45	7 62	13 65	12 71	17 86					
Norfolk	12 08	21 36	13 46	14 42	16 94	6 04	4 89	6 86	11 76	10 30	16 29					
Haldimand	12 14	13 34	12 54	14 81	16 14	5 31	5 55	6 50	10 71	9 65	16 35					
Welland	12 22	14 90	12 63	12 75	16 39	5 20	5 22	6 84	9 38	9 26	13 99					
Group	16 34	16 16	16 33	15 49	18 53	6 17	5 42	7 10	11 86	12 53	16 67					
Lambton	14 99	19 82	15 83	14 63	16 99	7 64	6 53	7 27	12 16	12 13	15 87					
Huron	9 87	23 10	20 07	22 58	20 19	8 33	7 98	7 67	9 31	12 71	19 22					
Bruce	9 05	22 60	20 29	24 22	20 08	6 11	7 08	6 92	10 50	15 98	17 63					
Group	14 22	22 14	17 58	18 36	18 07	7 12	7 35	7 26	11 50	12 48	16 50					
Grey	9 05	22 94	20 48	24 81	20 40	6 61	7 59	6 92	14 42	13 69	18 04					
Simcoe	8 10	20 46	16 29	21 00	19 43	5 96	6 84	6 96	12 95	15 13	18 99					
Group	8 43	21 86	18 42	23 28	19 93	6 20	7 06	6 95	13 37	14 68	17 46					
Middlesex	15 03	22 14	16 92	17 16	18 61	7 60	5 58	7 54	13 69	12 19	17 11					
Oxford	14 35	24 58	18 21	20 48	18 31	8 48	6 24	7 03	15 19	13 24	21 59					
Brant	13 81	20 36	15 37	18 02	18 46	6 42	5 37	6 57	9 31	12 45	15 79					
Perth	11 66	23 72	22 82	24 63	21 57	8 40	5 58	7 49	10 50	13 05	20 26					
Wellington	10 05	25 00	23 93	24 42	21 57	6 95	8 07	7 84	10 51	9 97	16 67					
Waterloo	10 71	20 26	17 08	18 68	18 46	7 64	5 76	6 92	10 50	15 00	17 57					
Dufferin	10 05	14 68	14 28	26 00	18 35	7 18	8 40	7 65	11 20	16 30	16 44					
Group	14 36	22 92	18 19	19 70	18 86	7 37	6 72	7 24	11 80	12 63	17 64					
Lincoln	13 27	21 00	14 46	17 00	17 28	6 42	5 61	7 54	8 75	10 69	17 85					
Wentworth	13 09	21 52	16 97	18 92	19 58	7 41	6 57	7 49	13 39	13 11	19 95					
Halton	10 21	19 54	16 54	23 54	19 69	3 82	4 59	6 18	8 40	12 21	16 70					
Peel	10 05	15 68	14 65	23 65	19 19	3 63	8 04	6 31	12 60	13 04	18 37					
York	11 26	21 46	19 59	24 32	19 66	5 88	6 90	7 48	8 75	11 93	19 16					
Ontario	10 57	24 44	19 20	21 50	18 31	6 38	6 63	7 54	14 00	12 06	18 10					
Durham	8 60	19 00	14 85	18 52	16 47	5 00	7 02	7 65	6 51	12 91	17 58					
Northumberland	9 25	18 92	13 80	17 76	16 15	4 97	6 57	7 32	8 47	13 24	17 76					
Prince Edward	8 52	15 28	10 42	17 06	14 44	5 54	6 69	7 47	7 42	10 95	18 35					
Group	10 65	19 99	15 33	19 69	17 36	5 41	6 70	7 43	9 58	12 38	18 21					
Lennox and Addington	10 19	16 83	12 23	16 66	15 94	6 69	6 63	7 94	8 61	13 43	20 63					
Frontenac	10 89	22 42	17 03	22 30	18 14	7 56	6 24	8 25	11 20	12 97	22 23					
Leeds	11 42	24 54	17 42	20 28	19 23	6 46	7 80	7 87	12 11	12 00	19 47					
Grenville	11 68	23 72	18 00	21 09	19 23	4 97	8 04	7 87	11 69	11 74	19 47					
Dundas	12 88	28 00	20 60	22 76	20 83	4 93	8 91	9 21	12 81	13 11	22 98					
Stormont	13 73	27 00	20 98	25 82	20 77	6 99	9 15	8 82	9 80	19 30	23 93					
Glengary	8 20	28 16	23 44	28 62	22 32	6 26	7 92	7 89	14 00	18 06	20 18					
Prescott	12 18	23 00	16 69	17 36	18 20	5 96	6 54	7 51	11 76	13 66	25 39					
Russell	12 40	25 84	20 54	20 08	20 16	5 39	7 71	8 59	12 11	14 28	20 11					
Carleton	14 95	25 16	22 46	24 90	20 33	5 62	7 80	7 94	15 19	15 52	21 91					
Renfrew	9 09	26 12	22 17	21 20	19 25	6 00	6 00	7 50	14 00	11 80	21 02					
Lanark	8 50	30 62	23 86	23 28	20 36	6 07	7 68	7 87	11 20	15 71	23 48					
Group	11 51	25 63	19 38	22 10	19 45	6 07	7 52	8 04	12 06	14 09	21 97					
Victoria	10 05	22 58	20 95	22 45	18 98	5 73	7 83	6 97	8 75	12 00	15 75					
Peterborough	8 04	24 50	21 38	24 59	19 30	5 81	6 99	6 94	14 00	13 24	15 73					
Haliburton	6 03	23 00	14 99	18 46	14 69	4 55	5 82	6 70	10 71	13 05	17 35					
Hastings	10 05	18 94	14 05	17 94	15 71	6 68	6 18	7 63	11 41	11 15	17 89					
Group	9 85	20 89	15 97	19 46	16 36	6 13	6 87	7 31	11 07	11 70	17 00					
Muskoka	6 37	26 00	16 07	16 81	13 05	5 46	5 73	8 72	14 00	5 87	16 61					
Parry Sound	8 04	27 01	16 58	14 95	13 77	6 30	6 81	7 36	10 50	13 03	17 32					
Nipissing	8 03	20 00	13 34	14 55	13 08	3 82	8 48	7 43	7 00	16 32	17 62					
Manitoulin	8 04	22 66	18 21	19 76	16 16	7 64	6 00	8 19	14 00	13 08	18 41					
Algoma	8 04	16 00	13 62	21 34	16 11	6 11	7 26	8 19	10 50	11 41	18 41					
Group	7 35	23 56	16 39	17 34	13 98	5 97	6 46	8 17	12 11	9 40	17 29					
The Province	14 25	22 41	17 22	18 75	18 43	6 03	6 85	7 55	11 76	12 65	17 31					

VALUE PER ACRE—POTATOES, MANGEL-WURZELS AND CARROTS.

TABLE XXI. Showing by County Municipalities and groups of Counties the market value per acre of Potatoes, Mangel-Wurzels and Carrots in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years 1882-98.

Counties.	Potatoes.			Mangel-wurzels.			Carrots.		
	1898.	1897.	1882-98.	1898.	1897.	1882-98.	1898.	1897.	1882-98.
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Essex	45 86	39 10	39 10	36 80	35 76	32 99	41 63	36 13	36 88
Kent	44 93	26 33	47 16	31 68	32 24	34 01	35 62	41 00	39 16
Elgin	48 07	25 94	40 03	39 68	36 72	37 06	51 37	43 38	45 16
Norfolk	37 49	25 94	40 75	32 72	30 16	32 83	38 38	39 00	38 53
Haldimand	30 43	21 15	39 91	32 56	18 32	26 03	33 75	31 75	32 65
Welland	34 40	14 36	36 43	31 36	22 88	31 79	41 88	34 25	37 19
Group.....	41 45	26 60	40 90	34 82	31 18	33 28	40 01	38 47	39 16
Lambton	43 66	22 34	37 80	39 60	28 88	34 37	45 62	38 13	42 48
Huron	33 96	35 91	49 40	37 68	35 60	38 15	46 62	45 12	47 71
Bruce	32 19	39 10	46 28	33 12	38 80	34 61	47 88	55 50	43 75
Group.....	36 33	32 83	45 35	37 06	34 95	36 80	46 74	45 39	45 18
Grey	35 28	37 11	49 80	32 48	34 80	33 66	42 62	41 00	44 81
Simcoe	46 30	38 30	49 43	35 84	37 04	34 07	43 75	48 88	45 52
Group.....	41 44	37 75	49 60	33 96	35 85	33 89	43 21	45 40	45 19
Middlesex	48 95	25 93	42 51	41 52	33 60	36 54	47 50	49 38	44 52
Oxford	47 63	33 92	44 86	45 36	34 96	39 22	47 38	42 25	49 88
Brant	40 13	30 32	43 51	39 04	39 76	39 81	37 00	42 75	50 56
Perth	35 72	29 13	46 05	39 52	32 88	37 68	51 00	48 12	48 07
Wellington	28 22	31 92	48 87	33 20	38 72	36 44	46 25	51 50	44 31
Waterloo	35 72	34 71	47 48	28 96	34 24	35 34	46 37	44 38	50 42
Dufferin	25 58	44 29	52 05	30 16	28 96	33 84	38 38	42 12	41 97
Group.....	36 54	32 43	46 52	39 71	34 86	37 39	46 44	46 95	47 05
Lincoln	37 04	28 33	37 72	29 20	32 48	31 50	35 75	47 50	38 59
Wentworth	41 01	29 13	45 69	41 36	39 28	39 30	46 12	51 88	48 28
Halton	30 43	35 11	42 99	38 96	42 00	36 69	49 00	48 62	47 59
Peel	28 22	36 71	40 09	31 60	41 36	33 22	41 63	55 13	42 85
York	31 31	31 12	41 42	32 80	36 24	35 16	45 38	45 50	49 11
Ontario	42 34	37 91	47 23	41 60	39 04	37 15	49 75	49 87	48 31
Durham	42 34	37 91	49 64	35 84	40 80	35 90	52 25	63 37	48 10
Northumberland	33 52	35 51	43 57	36 32	38 48	35 10	45 00	48 12	42 71
Prince Edward	29 11	33 12	37 28	25 36	30 16	25 25	27 12	46 00	30 54
Group.....	35 02	33 81	43 25	35 97	38 47	35 45	44 57	50 93	46 08
Lennox and Addington	33 52	43 89	45 16	25 84	23 60	26 92	27 62	32 63	34 54
Frontenac	36 60	39 90	42 13	27 20	24 72	28 11	31 38	30 88	33 84
Leeds	22 93	52 27	46 99	35 12	32 56	32 73	42 62	36 87	41 14
Grenville	30 87	50 67		36 00	39 23		45 87	50 63	
Dundas	40 57	46 28	54 44	29 36	32 24	33 58	45 00	41 00	46 63
Stormont	22 93	39 50	46 57	38 72	32 00	31 55	50 00	43 87	40 88
Glengarry	32 63	49 08	44 95	39 04	38 64	32 52	54 13	62 12	48 40
Prescott	50 72	46 28	50 58	32 72	25 36	29 70	47 50	39 12	39 51
Russell	55 57	47 48	45 33	33 52	37 28	32 91	42 50	53 83	45 13
Carleton	49 39	49 03	51 73	34 48	37 12	31 21	43 75	47 75	40 93
Renfrew	44 98	47 88	58 21	38 40	30 00	31 33	50 00	36 50	39 25
Lanark	35 28	61 84	56 98	38 24	29 36	33 51	41 13	40 00	42 74
Group.....	38 51	48 20	49 63	34 23	32 82	31 40	43 44	43 88	40 96
Victoria	31 75	48 28	50 90	31 76	33 36	36 26	44 25	40 63	46 04
Peterborough	33 03	57 46	47 84	37 52	41 28	31 72	44 25	58 00	43 96
Haliburton	14 55	44 69	52 38	13 04	22 40	23 47	18 76	32 26	32 48
Hastings	32 19	42 29	47 10	26 88	33 04	28 82	40 37	52 75	38 88
Group	31 36	47 84	48 54	31 68	34 69	32 96	41 83	52 44	42 82
Muskoka	35 28	61 05	54 47	20 64	26 40	22 26	28 63	42 38	35 63
Parry Sound	33 96	57 86	57 96	22 00	33 03	27 59	34 12	58 50	36 20
Nipissing	28 67	63 04	49 54	32 00	24 00	27 67	37 48	37 58	35 13
Manitoulin	47 63	57 06	65 08	16 00	24 00	26 26	25 00	41 12	35 67
Algoma	52 48	63 04		20 00	21 00		35 38	42 86	
Group.....	38 71	60 17	57 93	22 28	25 98	24 76	31 08	41 12	35 78
The Province	37 26	37 94	46 59	36 65	35 17	35 42	43 42	46 09	44 09

VALUE PER ACRE—TURNIPS, HAY AND FALL FIELD CROPS.

TABLE XXII. Showing by County Municipalities and groups of Counties the market value per acre of Turnips, Hay and Clover and all field crops in Ontario in the years 1897 and 1898, with the yearly average for the seventeen years, 1882-98.

Counties.	Turnips.			Hay and clover.			All field crops.		
	1898.	1897.	1882-98	1898.	1897.	1882-98.	1898.	1897.	1882-98.
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Essex	38 60	28 90	28 95	11 94	13 57	15 10	14 39	13 73	15 73
Kent	32 10	33 20	34 48	11 32	15 08	14 87	14 16	14 13	15 87
Elgin	40 70	41 20	38 42	10 70	15 01	14 37	13 40	14 16	14 99
Norfolk	35 20	36 90	38 22	10 33	12 85	12 66	11 40	12 29	13 27
Haldimand	27 90	30 40	29 26	11 01	14 22	11 87	10 57	12 05	11 86
Welland	27 40	29 70	33 02	10 64	12 06	12 64	11 33	10 73	12 72
Group.....	34 78	35 20	36 02	10 99	13 91	13 58	12 84	13 11	14 32
Lambton	46 30	39 20	35 64	10 51	14 93	13 75	13 10	12 42	14 00
Huron	43 90	47 70	41 93	11 26	14 43	13 09	12 86	13 80	14 69
Bruce	48 50	49 80	43 15	10 88	13 79	11 86	12 81	12 73	13 73
Group.....	46 15	48 46	42 31	10 94	14 34	12 80	12 90	13 09	14 19
Grey	45 40	45 90	42 52	10 70	12 92	11 70	11 88	11 94	13 32
Simcoe	43 90	47 30	44 40	10 57	12 64	12 68	12 65	12 43	14 35
Group	44 76	46 50	43 01	10 65	12 80	12 09	12 26	12 18	13 81
Middlesex	46 80	44 20	40 60	12 25	15 29	14 75	14 10	14 38	15 20
Oxford	50 70	47 90	46 27	12 19	15 87	14 97	14 78	15 63	15 97
Brant	37 40	45 00	45 98	12 32	15 15	13 75	13 95	14 99	15 11
Perth	47 60	41 80	41 99	11 63	15 94	14 32	14 20	14 55	15 60
Wellington	45 80	45 40	44 61	12 32	14 86	14 06	13 45	12 92	15 37
Waterloo	47 40	44 40	42 15	12 00	14 29	14 15	13 79	14 06	15 63
Dufferin	43 70	45 40	43 97	10 57	13 50	12 57	10 96	11 67	13 79
Group.....	46 05	45 11	44 05	11 99	15 16	14 26	13 72	14 04	15 33
Lincoln	34 20	42 00	35 25	11 51	13 71	12 76	11 88	13 38	13 39
Wentworth	38 00	49 00	46 44	12 07	12 71	13 45	13 14	14 40	15 00
Halton	42 40	46 90	43 92	11 01	12 56	12 64	12 45	14 77	14 34
Peel	31 10	47 60	40 21	12 13	11 92	13 12	12 09	13 28	14 23
York	36 60	46 80	41 49	12 25	11 92	13 11	13 49	13 51	15 02
Ontario	44 20	44 80	43 62	12 50	13 07	13 52	13 87	12 96	15 29
Durham	38 20	53 70	45 46	12 81	10 34	13 00	12 10	11 30	13 89
Northumberland	33 20	49 50	41 59	12 00	7 90	11 65	10 91	10 26	12 23
Prince Edward	29 00	35 50	29 60	12 19	10 20	11 77	9 79	9 31	11 03
Group.....	38 73	47 77	43 35	12 12	11 55	12 83	12 40	12 54	14 00
Lennox and Addington	23 10	26 70	24 90	9 33	8 83	11 18	9 70	9 14	11 57
Frontenac	36 80	30 40	31 89	10 89	11 13	11 49	10 77	10 71	12 03
Beeds	52 50	44 00	40 07	10 20	9 12	11 96	11 16	10 80	12 84
Grenville	39 40	52 10	40 07	10 57	8 62	11 96	11 53	10 95	12 84
Dundas	38 20	39 00	36 86	12 32	10 63	14 77	12 90	11 95	14 86
Stormont	41 30	41 40	30 96	10 57	9 69	14 11	11 91	11 30	14 02
Glengarry	43 30	53 80	43 07	11 88	8 11	14 62	12 38	11 13	13 73
Prescott	36 00	38 10	38 12	11 32	5 74	13 56	12 17	8 59	13 19
Russell	44 00	55 20	44 76	10 89	6 89	13 44	13 00	9 99	13 58
Carleton	46 10	41 50	38 80	11 76	6 03	13 27	13 56	10 16	14 25
Renfrew	43 90	36 40	37 11	10 08	6 25	10 67	11 59	8 71	12 31
Lennox	44 70	43 80	41 06	8 33	5 60	12 30	11 29	9 30	13 05
Group.....	43 79	41 71	38 36	10 58	7 92	12 50	11 76	10 09	13 07
Victoria	38 50	41 00	39 67	12 07	7 90	11 46	11 85	10 09	13 05
Peterborough	44 00	52 00	41 46	11 76	7 18	10 46	11 50	10 30	12 10
Haliburton	22 50	38 60	28 61	7 65	8 26	9 68	7 49	8 46	11 06
Hastings	36 00	43 40	36 35	10 82	8 83	11 25	10 65	10 08	12 08
Group.....	38 71	44 38	39 05	11 12	8 17	11 01	11 11	10 07	12 35
Muskoka	32 70	32 80	32 07	9 45	9 76	11 52	9 59	10 50	12 84
Parry Sound	35 70	35 10	32 77	8 52	7 97	10 09	9 53	10 10	12 36
Nipissing	40 00	23 30	32 08	8 71	5 82	10 89	10 23	8 98	12 52
Manitoulin	37 50	39 00	35 67	7 65	6 89	01	10 63	9 24	14 30
Algonia	30 70	39 80	35 67	9 70	10 63	01	11 62	12 15	14 30
Group.....	34 54	34 98	33 23	8 87	8 51	11 24	10 18	10 29	13 18
The Province	42 70	45 73	42 55	11 15	11 69	12 86	12 51	12 29	14 00

PART IV.

CHATTEL MORTGAGES.

The following statement gives the number of chattel mortgages on record and undischarged for the Province of Ontario for the year ending December 31, 1898, and the nine preceding years :

Year ending Dec. 31.	To secure existing debt or present advance.		To secure future indor-sation or advance.		Total.	
	No.	Amount.	No.	Amount.	No.	Amount.
		\$		\$		\$
1898	19,526	12,001,075	283	281,142	19,809	12,282,217
1897	21,144	13,004,342	342	377,853	21,526	13,382,195
1896	21,402	13,180,205	347	381,511	21,789	13,561,716
1895	22,018	10,555,922	373	456,398	22,391	11,012,320
1894	21,276	10,603,393	483	616,812	21,759	11,220,205
1893	19,342	8,973,118	580	360,267	19,722	9,333,385
1892	18,927	9,215,753	455	829,724	19,382	10,045,477
1891	18,902	8,595,417	516	908,971	19,418	9,504,388
1890	17,271	8,121,316	632	857,542	17,903	8,978,858
1889	15,629	6,973,837	585	518,071	16,214	7,491,908

The following statement gives the numbers and amounts of chattel mortgages in the different districts of the Province for 1898 and previous three years :

Districts.	1898.		1897.		1896.		1895.	
	No.	Amount.	No.	Amount.	No.	Amount.	No.	Amount.
		\$		\$		\$		\$
Lake Erie	2,999	886,162	2,999	1,062,301	2,644	1,083,750	2,934	1,066,587
Lake Huron	1,724	686,599	2,031	805,123	2,079	815,701	2,247	760,168
Georgian Bay	1,870	622,481	2,193	912,864	2,218	897,148	2,236	876,963
West Midland	2,559	1,277,880	2,935	1,448,824	3,113	1,451,764	3,209	1,582,895
Lake Ontario	5,093	2,810,410	5,281	3,212,610	5,585	3,151,305	5,724	3,320,257
St. Lawrence & Ottawa	2,939	1,480,645	3,259	1,952,957	3,317	1,698,551	3,302	1,578,788
East Midland	1,396	1,797,604	1,686	1,960,830	1,728	2,473,533	1,714	768,675
Northern Districts	1,229	2,720,436	1,142	2,026,686	1,105	1,989,964	1,025	1,077,987
The Province	19,809	12,282,217	21,526	13,382,195	21,789	13,561,716	22,391	11,012,320

More than one half the number of the chattel mortgages are registered against farmers. The following statement gives the numbers and amounts of chattel mortgages on record against farmers on December 31 of each of the years 1895, 1896, 1897, 1898 :

Districts.	1898.		1897.		1896.		1895.	
	No.	Amount.	No.	Amount.	No.	Amount.	No.	Amount.
		\$		\$		\$		\$
Lake Erie	2,019	456,533	2,015	499,701	1,601	473,418	1,980	476,720
Lake Huron	1,153	325,293	1,376	391,996	1,455	477,770	1,516	401,273
Georgian Bay	1,453	434,778	1,706	473,941	1,717	492,840	1,713	474,511
West Midland	1,214	593,185	1,456	692,329	1,577	686,272	1,656	671,827
Lake Ontario	1,664	901,235	2,050	935,082	1,987	827,710	1,983	821,978
St. Lawrence & Ottawa	1,473	433,680	1,678	464,732	1,644	437,001	1,679	457,929
East Midland	990	323,873	1,220	385,498	1,281	391,089	1,206	361,639
Northern Districts	665	111,920	662	90,321	582	91,898	655	97,719
The Province	10,631	3,580,497	12,103	3,933,600	11,844	3,877,998	12,288	3,767,596

CHATTEL MORTGAGES—BY COUNTY DIVISIONS.

TABLE I. Showing by County Municipalities of Ontario the total number and amount of chattel mortgages and renewals on record and undischarged on January 1st and December 31st, 1898.

Counties or districts.	Chattel mortgages on record January 1st, 1898.				Chattel mortgages on record December 31st, 1898.			
	To secure existing debt.		For future indorsa- tion.		To secure existing debt.		For future indorsa- tion.	
	No.	Amount.	No.	Amount.	No.	Amount.	No.	Amount.
		\$		\$		\$		\$
Algoma	227	454,074	2	1,800	212	516,258		
Brant	276	154,051	7	2,300	372	215,949	7	5,462
Bruce	764	222,937			911	312,201	2	5,700
Carleton	686	592,563	7	8,550	716	1,049,157	14	23,901
Dufferin	275	80,752			351	126,904	2	1,300
Elgin	417	149,659			447	175,734	1	1,154
Essex	528	206,628	16	59,364	526	261,642	42	49,177
Frontenac	477	173,964			528	178,918		
Grey	1,059	258,501			1,251	359,412		
Haldimand	176	48,726			183	61,256		
Haliburton	69	408,501			81	422,138	3	3,993
Halton	138	84,881			147	74,880	1	3,000
Hastings	623	214,850	34	8,998	768	224,329	59	11,225
Huron	400	189,606	9	2,245	501	215,890	10	1,670
Kent	1,330	255,793	2	800	1,262	307,304	2	21,500
Lambton	475	252,762	76	19,049	529	234,426	78	35,236
Lanark	213	75,008	2	1,238	248	98,034	10	1,404
Leeds and Grenville	396	147,339	27	13,949	444	172,881	31	9,823
Lennox and Addington	246	83,198	3	1,456	296	87,063	4	863
Lincoln	305	174,854	3	16,233	307	169,520	8	16,999
Manitowlin	105	104,736	1	2,500	95	68,190		
Middlesex	759	304,323			828	339,076		
Muskoka	263	135,118			266	129,463		
Nipissing	237	815,688			195	579,363		
Norfolk	269	61,786			272	68,832		
Northumberland and Durham	666	284,081			751	292,617		
Ontario	408	265,548	7	4,883	435	254,325	22	10,113
Oxford	305	191,976	3	5,660	335	172,847	1	500
Parry Sound	271	567,386	1	31,000	244	576,910	4	65,500
Peel	168	91,486	2	560	244	137,772		
Perth	245	129,684			289	150,523		
Peterborough	345	628,228			384	681,504		
Prescott and Russell	201	66,479			243	79,911		
Prince Edward	188	74,389	3	325	222	75,532	6	4,010
Rainy River	79	571,433			79	63,032		
Renfrew	332	171,648	13	19,925	329	104,314	12	6,991
Simcoe	811	363,980			942	553,452		
Stormont, Dundas and Glengarry	321	122,171	15	3,157	367	127,271	17	12,426
Thunder Bay	42	35,201	1	1,500	44	27,420	3	550
Victoria	321	535,893	4	1,134	388	611,334	3	6,307
Waterloo	274	184,281	3	875	265	185,479		
Welland	254	98,728	7	4,678	262	107,852	2	8,350
Wellington	432	234,178			485	250,784		
Wentworth	715	321,534	7	10,048	661	298,487	15	13,730
York	2,425	1,423,173	28	58,895	2,439	1,804,656	23	57,169
Total	19,526	12,001,075	283	281,142	21,144	13,004,342	382	377,853

CHATTEL MORTGAGES—FARMERS.

TABLE II. Showing by County Municipalities of Ontario the number and amount of chattel mortgages and renewals registered against farmers, on record and undischarged on January 1st and December 31st, 1898.

Counties or districts.	Chattel mortgages on Record January 1st, 1898.				Chattel mortgages on record December 31, 1898.			
	To secure existing debt.		For future indorsa- tion.		To secure existing debt.		For future indorsa- tion.	
	No.	Amount.	No.	Amount.	No.	Amount.	No.	Amount.
		\$		\$		\$		\$
Algoma	132	29,196			99	16,136		
Brant	140	82,942	3	380	171	132,896	4	462
Bruce	559	135,685			672	171,141		
Carleton	91	28,102	1	100	142	50,055	2	480
Dufferin	217	61,927			272	74,825	2	1,300
Elgin	213	68,576			233	71,381	1	954
Essex	333	96,197			324	114,228	26	3,655
Frontenac	261	77,684			249	64,760		
Grey	858	182,023			1,011	179,276		
Haldimand	136	39,379			119	33,998		
Haliburton	63	6,608			71	7,720		
Halton	54	48,761			81	48,060		
Hastings	481	155,801	25	4,970	596	163,240	41	5,796
Huron	241	107,942	2	695	312	124,306	9	1,583
Kent	1,053	196,020			1,022	208,641		
Lambton	309	74,287	42	6,684	347	89,246	35	5,720
Lanark	109	36,606			134	44,048	8	1,104
Leeds and Grenville	257	66,170	19	6,873	293	70,367	19	4,984
Lennox and Addington	141	58,377	1	125	184	55,553	2	280
Lincoln	107	39,221			136	54,249	4	466
Manitowlin	70	19,310			65	14,155		
Middlesex	290	129,201			335	137,456		
Muskoka	184	20,785			189	21,644		
Nipissing	136	23,189			105	21,478		
Norfolk	200	30,170			183	35,493		
Northumberland and Durham	463	178,599			548	212,552		
Ontario	276	265,548	7	4,883	379	213,361	21	9,850
Oxford	138	73,071	2	4,660	169	71,843		
Parry Sound	128	15,490			122	13,433		
Peel	112	65,244			177	96,724		
Perth	117	71,152			145	80,211		
Peterborough	174	61,829			199	72,680		
Prescott and Russell	170	45,956			198	61,389		
Prince Edward	147	53,695	2	225	189	58,464	4	1,310
Rainy River	7	1,890			10	1,183		
Renfrew	226	55,562	3	966	294	48,927	3	262
Simcoe	595	252,755			695	294,665		
Stormont, Dundas and Glengarry	186	55,117	8	2,042	219	60,875	11	1,648
Thunder Bay	8	2,060			11	2,242	1	59
Victoria	247	94,665			313	136,062		
Waterloo	86	52,503			93	51,829		
Wendland	84	26,191			107	31,351		
Wellington	221	117,349			265	141,507		
Wentworth	160	64,667	2	340	149	65,032	7	4,506
York	334	180,052			355	170,508		
Total	10,514	3,547,554	117	32,943	11,902	3,889,190	201	44,410

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 Weather : Temperature, 1, 40—Sunshine, 3, 42—Rain and Snow, 2, 42, 43—Temiscamingue, 4, 46—Toronto, 45.
 Wheat, Fall : Description, 7—Area and produce, 6, 8, 24, 48—Value, 93, 112, 120.
 Wheat, Spring : Description, 9—Area and produce, 6, 9, 24, 47—Value, 93, 112, 120.
 Woodland : 5, 47.
 Wool : Clip, 70, 94—Values, 119.
 Yields of crops : 24, 25.

ANNUAL REPORT
OF THE
BUREAU OF INDUSTRIES
FOR THE
PROVINCE OF ONTARIO
1898.
PART V. -MUNICIPAL STATISTICS.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE.)

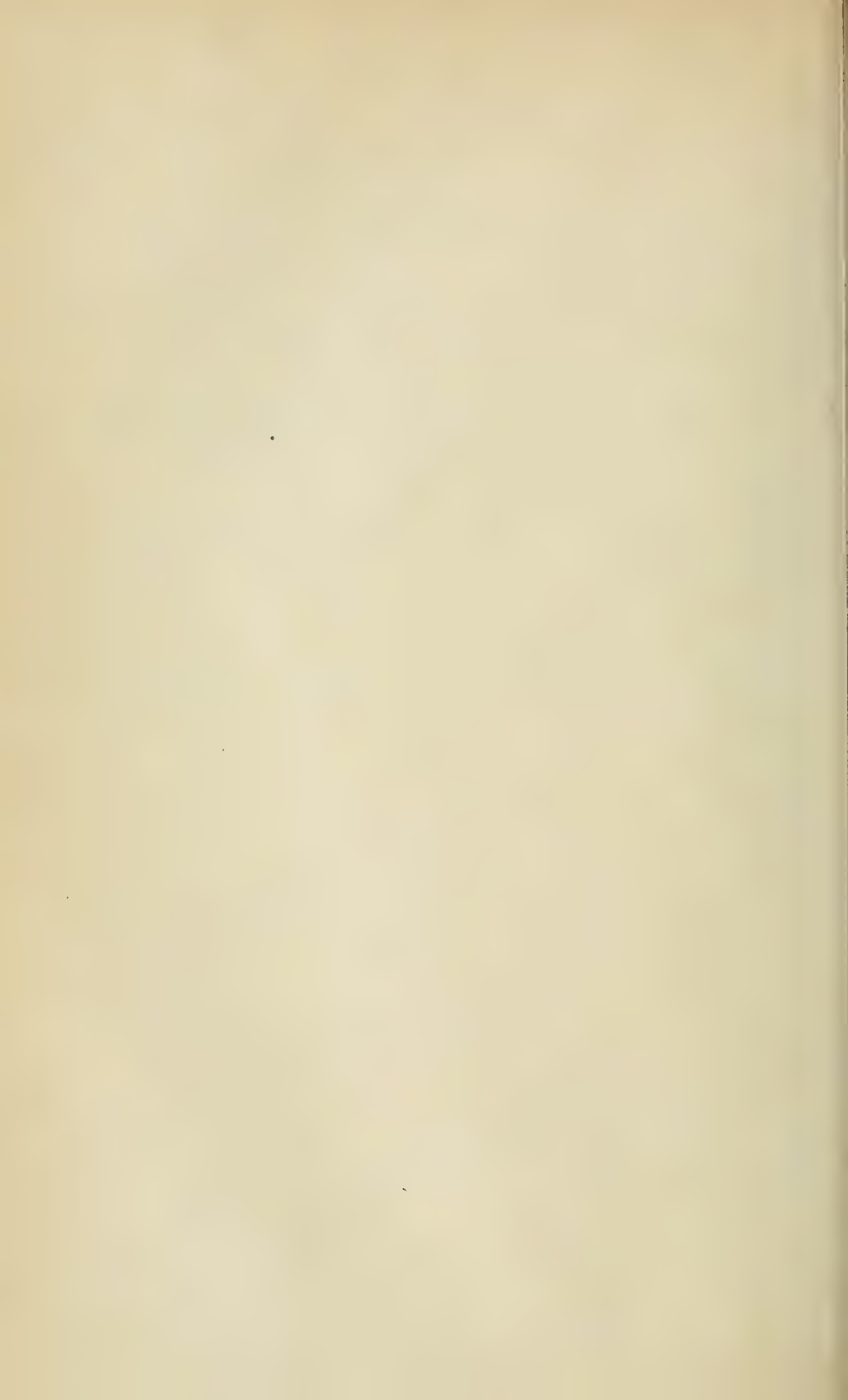
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THE LEGISLATIVE ASSEMBLY OF ONTARIO.



TORONTO:
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1899

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SEVENTEENTH ANNUAL REPORT
OF THE
ONTARIO BUREAU OF INDUSTRIES.

PART V.

1898.

To the Honorable the Minister of Agriculture :

SIR,—I have the honor to present herewith Part V. of the seventeenth annual report of the Bureau of Industries for 1898, containing tabulated statements of statistics of population, assessment and taxation of the municipalities of Ontario up to December 31, 1898, and the financial statements of municipalities for 1897.

I have the honor to be, Sir,

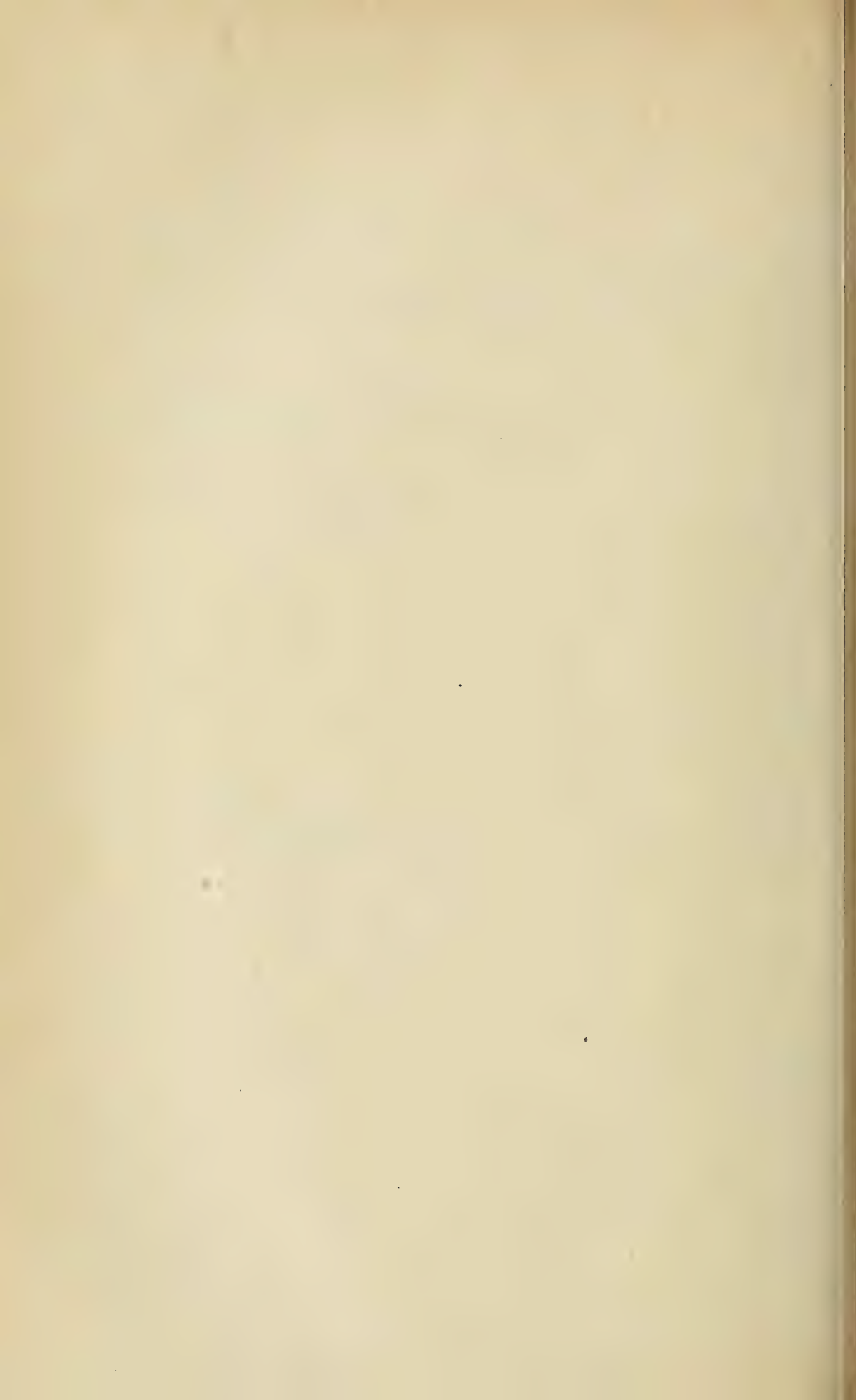
Your obedient servant,

C. O. JAMES,

Secretary.

TORONTO,

November, 1899.



PART V.

MUNICIPAL STATISTICS.

The following statement is compiled from the summarized tables and gives populations, total assessments, amount of taxes imposed for 1898, the amount of debenture and floating debt, together with the amount paid each year by all municipalities of the Province for interest for the twelve years 1886-97.

Year.	Popula- tion.	Total assessment.	Taxes imposed for all purposes.			Debenture debt.		Floating debt.	Interest paid * on loans and deben- tures.
			Total.	Rate per head.	Mills on the dollar.	Total.	Rate per head.		
		\$	\$	\$ c.		\$	\$ c.	\$	\$
1898	2,001,350	809,184,833	12,222,966	6 10	15.11	*	*	*	*
1897	1,990,977	803,625,377	12,206,325	6 13	15.19	53,577,475	26 91	6,482,953	2,553,988
1896	1,972,286	814,917,633	12,122,785	6 15	14.88	52,948,275	26 85	6,261,394	2,588,759
1895	1,957,390	821,466,166	12,316,429	6 29	14.99	51,895,991	26 51	5,834,129	2,578,220
1894	1,936,219	826,179,370	12,320,312	6 36	14.91	49,724,587	25 68	6,669,567	2,552,607
1893	1,910,059	825,530,052	12,512,660	6 56	15.17	48,083,243	25 17	6,796,422	2,508,621
1892	1,909,527	825,211,127	11,803,571	6 18	14.30	47,166,962	24 70	6,449,899	2,482,156
1891	1,922,121	818,847,394	11,767,748	6 12	14.37	43,888,853	22 83	7,629,730	2,498,294
1890	1,917,514	798,616,271	10,897,485	5 68	13.65	40,720,985	21 24	8,387,186	2,240,692
1889	1,906,901	761,905,816	10,248,198	5 37	13.45	38,988,332	20 44	6,493,519	2,057,938
1888	1,880,145	748,654,570	9,919,962	5 28	13.25	34,729,527	18 47	6,437,363	1,999,760
1887	1,848,457	717,311,988	9,300,113	5 03	12.97	31,943,320	17 28	5,645,208	1,820,590
1886	1,828,495	694,380,659	9,009,385	4 93	12.97	29,924,863	16 37	4,841,717	1,715,620

* Statistics of debts for 1898 are not yet complete.

The following table shows the growth of population by municipalities for thirteen years:

Year.	Townships.	Towns.	Villages.	Cities.	Total.
1898	1,110,894	314,820	134,747	440,889	2,001,350
1897	1,113,530	312,947	133,560	430,940	1,990,977
1896	1,112,900	306,001	132,451	420,934	1,972,286
1895	1,109,631	300,655	130,889	416,215	1,957,390
1894	1,103,878	297,194	126,887	408,810	1,936,219
1893	1,096,984	292,285	123,125	397,665	1,910,059
1892	1,102,467	291,706	121,690	393,664	1,909,527
1891	1,116,347	287,864	122,691	395,229	1,922,121
1890	1,118,252	410,530		388,762	1,917,544
1889	1,130,060	400,890		375,951	1,906,901
1888	1,133,046	393,461		353,538	1,880,145
1887	1,140,138	377,389		330,930	1,848,457
1886	1,148,856	360,005		319,634	1,828,495

In 1898 there were 498 organized township municipalities, 100 towns, 136 villages, 13 cities and 33 counties.

Following is a comparative table for thirteen years for total assessed values :

Year.	Townships.	Towns.	Villages.	Cities.	Total.
	\$	\$	\$	\$	\$
1898	448,810,060	93,529,372	30,768,025	236,077,376	809,184,833
1897	444,722,478	91,438,546	30,497,707	236,960,646	803,625,377
1896	447,117,383	91,269,208	30,005,839	246,525,203	814,917,633
1895	448,417,259	93,646,835	29,711,010	249,691,062	821,466,166
1894	451,476,103	93,065,465	29,007,928	252,629,874	826,179,370
1893	451,629,103	94,213,304	28,463,366	251,224,279	825,530,052
1892	452,065,658	93,867,423	28,043,948	251,234,098	825,211,127
1891	454,070,364	92,555,035	27,820,773	244,401,222	818,847,394
1890	452,467,088	115,402,233		230,746,950	798,616,271
1889	450,977,220	106,453,798		204,474,798	761,905,816
1888	460,615,822	100,413,029		187,625,719	748,654,570
1887	456,170,163	93,337,596		167,804,179	717,311,938
1886	452,697,645	88,078,093		154,204,921	694,380,659

The amount of taxes imposed for all purposes (general and local) in townships, towns, villages and cities is shown in the following, for thirteen years :

Year.	Townships.	Towns.	Villages.	Cities.	Total.
	\$	\$	\$	\$	\$
1898	4,461,474	2,095,791	570,912	5,094,789	12,222,966
1897	4,407,005	2,069,444	569,884	5,160,592	12,206,925
1896	4,292,741	2,005,132	557,003	5,267,909	12,122,785
1895	4,473,269	2,021,455	544,111	5,277,594	12,316,429
1894	4,579,044	1,955,980	526,813	5,258,475	12,320,312
1893	4,629,028	1,944,221	505,231	5,444,180	12,522,660
1892	4,599,442	1,876,420	499,575	4,828,133	11,803,570
1891	4,544,291	1,811,517	493,508	4,918,432	11,767,748
1890	4,473,108	2,161,644		4,262,733	10,897,485
1889	4,507,717	1,993,623		3,746,858	10,248,198
1888	4,494,780	1,884,918		3,540,264	9,919,962
1887	4,431,720	1,759,248		3,109,145	9,300,113
1886	4,378,401	1,670,848		2,950,136	9,009,385

The next table compares the debenture debt outstanding in the various municipalities on December 31st, for each of twelve years :

Year.	Townships.	Towns.	Villages.	Cities.	Counties.	Total
	\$	\$	\$	\$	\$	\$
1897	2,917,091	9,850,615	1,160,285	37,846,377	1,804,107	53,577,475
1896	2,866,904	9,598,063	1,163,096	37,471,230	1,848,982	52,948,275
1895	2,992,643	9,090,368	1,175,803	36,452,914	2,184,263	51,815,991
1894	2,942,267	8,611,052	1,132,942	34,778,154	2,260,172	49,724,587
1893	3,000,824	8,222,289	1,032,476	33,399,063	2,339,592	48,083,243
1892	3,089,430	7,491,878	1,087,468	32,966,371	2,531,815	47,166,962
1891	3,118,639	6,775,715	993,945	30,253,043	2,747,511	43,888,853
1890	3,366,617	7,099,648		27,110,712	3,144,008	40,720,985
1889	3,299,557	6,371,763		26,096,152	3,220,860	38,988,332
1888	3,409,744	6,146,861		21,769,261	3,403,961	34,729,527
1887	3,154,428	5,261,078		20,080,924	3,446,891	31,943,320
1886	3,153,646	4,795,580		18,469,893	3,505,744	29,924,863

The amount of floating liabilities of the municipalities on December 31st, 1897, was \$6,482,953, of which \$3,219,853 was for temporary loans.

STATISTICS OF
ONTARIO MUNICIPALITIES.
1897-8.

POPULATION, ASSESSMENT AND TAXATION.

TABLE I. Detailed Statement by Local Municipalities (townships, towns and villages) in the Counties of Ontario for 1898, of the population, the area, the assessed values and amount of taxes imposed for all purposes inclusive of schools, as shown by the assessment and collection rolls, together with the average rate per head of the resident population, and also the average rate on the dollar.

Municipalities.	Popula- tion.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Per- sonal prop- erty.	Taxable income.	Total.	Total.	Per head.	Mills on \$.
			\$	\$	\$	\$	\$	\$ c.	
ESSEX :									
Anderdon	1,883	23,151	639,330			639,330	9,716	5 16	15.2
Colchester, N.	1,259	30,472	596,534			596,534	14,171	11 26	23.8
Colchester, S.	2,666	34,417	1,004,842	4,500	1,200	1,010,542	20,832	7 81	20.6
Gosfield, N.	1,733	27,851	701,760		300	702,060	9,769	5 64	13.9
Gosfield, S.	2,240	30,038	1,011,715	11,800		1,023,515	14,542	6 49	14.2
Maidstone.	3,013	44,535	806,690	2,300		808,990	18,564	6 16	22.9
Malden.	1,450	20,894	713,629		1,250	714,879	7,346	5 07	10.3
Mersea.	4,076	61,944	1,789,895	6,870		1,796,765	28,477	6 99	15.8
*Pelee Island.	657	9,657	269,690			269,690	7,162	10 90	26.6
Rochester.	2,554	32,452	625,860	2,700		628,560	11,001	4 31	17.5
Sandwich, E.	2,678	18,682	614,966	1,625		616,591	13,397	5 00	21.7
Sandwich, S.	1,707	23,549	595,184	2,200		597,384	10,592	6 21	17.7
Sandwich, W.	2,539	23,299	697,757			697,757	11,876	4 68	17.0
Tilbury, N.	2,363	26,730	652,575	1,000		653,575	10,937	4 64	16.8
Tilbury, W.	2,186	22,473	633,380			633,380	14,676	6 71	23.2
Total townships	33,004	430,144	11,353,807	32,995	2,750	11,389,552	203,078	6 15	17.8
Amherstburg.	2,075	405	445,655	23,900	2,900	472,455	11,630	5 60	24.6
Essex.	2,000	700	345,728	29,150	2,300	377,178	11,823	5 91	31.4
Leamington.	2,729	750	415,970	38,475	3,675	458,520	6,956	2 55	15.2
Sandwich.	1,412	2,000	412,778	8,575	1,090	422,443	6,877	4 87	13.3
*Walkerville.	1,161	450	1,047,542	852,716	52,450	1,952,708	25,707	22 14	34.2
Total towns.	9,377	4,305	2,667,673	953,216	62,415	3,683,304	62,993	6 72	17.1
Belle River.	542	333	53,378	2,600		55,978	1,175	2 17	21.0
Kingsville.	1,188	451	361,696	13,683	3,371	378,750	9,683	8 15	25.6
Total villages.	1,730	784	415,074	16,283	3,371	434,728	10,858	6 28	25.0
KENT :									
Camden.	2,501	40,647	1,012,410	1,700		1,014,110	13,703	5 48	13.5
Chatham.	5,520	84,230	1,974,213	2,400	500	1,977,113	39,878	7 22	20.2
Dover.	4,343	67,494	1,707,767	750		1,708,517	25,910	5 97	15.2
Harwich.	4,733	88,154	3,686,226	3,850	1,400	3,691,476	31,253	6 60	8.5
Howard.	3,614	58,693	2,441,290	1,400	1,000	2,443,690	17,696	4 90	7.2
Orford.	2,649	49,815	1,433,950	6,000	750	1,440,700	15,726	5 94	10.9
Raleigh.	4,553	71,220	2,450,060	5,200		2,455,260	33,949	7 46	13.8
Romey.	1,741	26,441	764,981	4,400		769,381	14,070	8 08	18.3
Tilbury, E.	3,027	55,004	1,460,330	6,800		1,467,130	27,502	9 09	18.7
Zone.	1,284	25,785	575,275			575,275	6,467	5 03	11.2
Total townships	33,965	567,483	17,506,502	32,500	3,650	17,542,652	226,144	6 66	12.9
Blenheim.	1,750	488	384,400	32,125	6,500	423,025	9,729	5 56	23.0
Bothwell.	959	2,250	192,855	22,025		214,880	4,913	5 12	22.9
Dresden.	1,785	642	370,390	23,200	900	394,490	9,153	5 13	23.2
Ridgetown.	2,223	685	588,820	46,100	2,000	636,920	14,423	6 49	22.6
Wallaceburg.	3,042	500	468,725	24,200	3,000	495,925	13,221	4 35	26.7
Total towns.	9,759	4,565	2,005,190	147,650	12,400	2,165,240	51,439	5 27	23.8
Thamesville.	883	380	181,425	21,125	6,600	209,150	5,095	5 77	24.4
Tilbury.	1,036	577	183,465	9,660		193,125	5,993	5 78	31.0
Total villages.	1,919	957	364,890	30,785	6,600	402,275	11,088	5 78	27.6

* Separated from county for municipal purposes.

NOTE.—The population in this table is from the assessment rolls taken in 1898. The assessed values on which the taxes imposed for 1898 are based are in many instances from the rolls taken in 1897, as provided by Statute. R.S.O. 1897, Chap. 224, Sec. 58.

POPULATION, ASSESSMENT AND TAXATION.—Continued

Municipalities.	Popula- tion.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Per- sonal prop- erty.	Taxable income.	Total.	Total.	Per head.	Mills on \$
			\$	\$	\$	\$	\$	\$ c.	
ELGIN :									
Aldborough	4,616	73,798	1,538,170	3,250	500	1,541,920	24,283	5 26	15.7
Bayham	3,491	56,661	1,052,875	4,150	100	1,057,125	18,527	5 31	17.5
Dorchester, S.	1,416	30,557	1,061,830	2,600	.....	1,064,430	9,881	6 94	9.2
Dunwich	3,024	69,423	1,722,130	3,100	.....	1,725,230	21,958	7 26	12.7
Malahide	3,768	62,354	1,895,500	16,480	2,400	1,914,380	20,666	5 47	10.8
Southwold	3,935	72,586	2,464,520	8,450	.....	2,472,970	22,991	5 84	9.3
Yarmouth	4,804	69,883	2,660,252	4,600	3,770	2,668,622	26,932	5 61	10.1
Total townships ..	25,054	435,262	12,395,277	42,630	6,770	12,444,677	145,128	5 79	11.7
Aylmer (town)									
Aylmer (town)	2,128	525	605,443	85,250	16,610	707,303	17,324	8 14	24.5
Dutton	829	500	165,180	18,850	800	184,830	3,478	4 20	18.8
Port Stanley	585	505	131,205	13,795	1,700	146,700	2,116	3 62	14.4
Springfield	450	406	74,710	.....	3,850	78,560	1,417	3 15	18.0
Vienna	354	1,000	69,870	3,500	800	74,170	1,567	4 26	20.3
Total villages	2,218	2,411	440,965	36,145	7,150	484,260	8,518	3 84	17.6
NORFOLK :									
Charlottetown	3,286	59,564	908,533	26,450	3,150	938,133	11,780	3 58	12.6
Houghton	2,028	33,296	460,340	3,050	.....	463,390	6,209	3 06	13.4
Middleton	2,693	44,844	749,368	8,100	.....	757,468	9,653	3 58	12.7
Townsend	3,312	64,909	2,355,550	5,225	.....	2,360,775	17,829	4 56	7.6
Walsingham, N.	2,261	40,137	561,065	1,300	1,200	563,565	8,304	3 67	14.7
Walsingham, S.	1,941	53,908	680,990	4,385	250	685,625	9,652	4 97	14.1
Windham	3,967	66,719	1,560,635	7,700	.....	1,568,335	13,192	3 33	8.4
Woodhouse	2,000	34,600	1,112,539	1,600	300	1,114,439	9,413	4 71	8.4
Total Townships ..	22,088	397,977	8,389,020	57,810	4,900	8,451,730	86,032	3 89	10.2
Simcoe (town)									
Simcoe (town)	2,840	807	818,150	49,600	38,689	906,439	19,220	6 77	21.2
Delhi	840	500	146,985	8,400	.....	155,385	3,128	3 72	20.1
Port Dover	1,154	413	249,057	9,280	2,050	260,387	5,491	4 76	21.1
Port Rowan	617	500	112,200	10,350	1,400	123,950	2,763	4 48	22.3
Waterford	1,047	419	246,860	11,625	1,260	259,625	6,290	6 01	24.2
Total villages	3,658	1,832	755,042	39,655	4,650	799,347	17,672	4 83	22.1
HALDIMAND :									
Canborough	981	21,411	354,044	600	.....	354,644	3,157	3 22	8.9
Cayuga, N.	1,612	32,366	722,620	6,375	.....	728,995	5,857	3 63	8.0
Cayuga, S.	804	13,269	396,360	1,000	800	398,100	2,489	3 10	6.3
Dunn	897	14,782	385,260	1,000	.....	385,260	3,245	3 62	8.4
Moulton	1,860	27,000	617,950	.....	.....	617,950	6,299	3 39	10.2
Oneida	1,665	32,742	956,290	350	400	957,040	9,012	5 41	9.4
Rainham	1,668	25,643	548,000	2,600	.....	550,600	5,647	3 42	10.3
Seneca	1,886	41,673	887,005	1,700	.....	888,705	8,038	4 26	9.0
Sherbrooke	398	4,688	153,401	.....	.....	153,401	1,297	3 26	8.6
Walpole	4,467	66,649	1,930,390	11,800	800	1,942,990	18,828	4 21	9.7
Total townships ..	16,239	280,223	6,951,260	24,425	2,000	6,977,685	63,919	3 94	9.2
Caledonia									
Caledonia	903	547	161,059	13,500	2,300	176,859	4,057	4 49	22.9
Cayuga	1,180	977	166,365	8,900	3,500	178,765	3,998	3 39	22.4
Dunnville	1,996	938	544,140	69,300	3,300	616,740	10,951	5 49	17.8
Hagersville	909	334	183,090	16,350	300	200,240	3,653	4 02	18.2
Total villages	4,988	2,796	1,054,654	108,550	9,400	1,172,604	22,659	4 54	19.3

POPULATION, ASSESSMENT AND TAXATION.—Continued.

Municipalities.	Popula- tion.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Per sonal prop- erty.	Taxable income.	Total.	Total.	Per head.	Mills on \$.
WELLAND :									
Bertie	3,034	34,584	1,619,120	76,600	.....	1,695,720	12,477	4 11	7.4
Crowland	962	19,194	393,140	900	.....	394,040	4,927	5 12	12.5
Humberstone	2,757	30,840	848,410	18,950	3,750	871,110	7,823	2 84	9.9
Pelham	2,335	28,841	968,585	15,500	100	984,185	7,355	3 15	7.5
Stamford	1,959	21,148	813,121	23,625	600	837,346	9,053	4 62	10.8
Thorold	1,961	22,883	649,698	26,275	.....	675,973	7,163	3 65	10.6
Wainfleet	2,737	51,000	879,000	46,000	400	925,400	10,517	3 84	11.4
Willoughby	959	18,638	417,634	10,325	.....	427,959	3,809	3 97	8.9
Total townships	16,704	227,128	6,588,708	218,175	4,850	6,811,733	63,124	3 78	9.3
Niagara Falls	4,178	1,082	2,111,220	101,975	6,300	2,219,495	46,784	11 20	21.1
Thorold	2,075	794	571,307	26,950	4,450	602,707	16,162	7 79	26.8
Welland	1,846	700	548,096	62,400	12,400	622,896	14,872	8 06	23.9
Total towns	8,099	2,576	3,230,623	191,325	23,150	3,445,098	77,818	9 61	22.6
Bridgeburg	1,239	500	454,105	12,850	.....	466,955	6,069	4 90	13.0
Chippawa	504	184	116,370	5,900	1,000	123,210	1,645	3 26	13.4
Fort Erie	901	698	312,560	3,850	5,000	321,410	4,315	4 79	13.4
Niagara Falls South ..	1,396	305	316,843	7,764	11,500	336,107	7,759	5 56	23.1
Port Colborne	1,120	212	277,870	29,631	9,800	317,301	5,912	5 28	18.6
Total villages	5,160	1,899	1,477,688	59,995	27,300	1,564,983	25,700	4 98	16.4
LAMBTON :									
Bosanquet	2,480	70,982	1,516,959	600	.....	1,517,559	13,545	5 46	8.9
Brooke	3,169	74,025	1,903,835	.....	.....	1,903,835	24,842	7 84	13.0
Dawn	3,475	65,518	867,834	3,400	.....	871,234	17,959	5 17	20.6
Enniskillen	5,075	82,124	1,511,495	6,100	.....	1,517,595	31,304	6 17	20.6
Euphemia	2,206	39,170	994,822	3,625	.....	998,447	8,792	3 99	8.8
Moore	4,879	73,277	1,778,520	16,920	1,200	1,796,640	25,810	5 29	14.4
Plympton	3,394	75,015	2,045,017	2,950	.....	2,047,967	21,181	6 24	10.3
Sarnia	2,145	38,366	762,983	.....	600	763,583	14,693	6 85	19.2
Sombra	3,715	72,420	1,009,280	3,000	.....	1,012,280	21,408	5 76	21.0
Warwick	3,104	71,020	2,027,715	.....	.....	2,027,715	15,657	5 04	7.7
Total townships	33,642	661,917	14,418,460	36,595	1,800	14,456,855	195,191	5 80	13.5
Forest	1,575	950	305,407	18,200	8,300	331,907	8,096	5 14	24.4
Petrollea	4,702	2,700	1,091,150	49,650	60,150	1,200,950	39,265	8 35	32.7
Sarnia	6,868	1,450	1,896,695	137,600	114,933	2,149,228	51,156	7 45	23.8
Total towns	13,145	5,100	3,293,252	205,450	183,383	3,682,085	98,517	7 49	26.8
Alvinston	981	430	179,330	15,770	.....	195,100	4,708	4 80	24.1
Arkona	478	500	78,185	3,950	.....	82,135	1,100	2 30	13.4
Oil Springs	1,074	1,883	233,780	15,450	.....	249,230	5,080	4 73	20.4
Point Edward	1,439	734	194,765	1,535	.....	196,300	3,126	2 17	15.9
Thedford	657	457	83,925	9,400	.....	93,325	1,620	2 47	17.4
Watford	1,273	400	218,245	25,275	2,425	245,945	5,762	4 53	23.4
Wyoming	749	479	115,495	12,450	1,600	129,545	2,867	3 83	22.1
Total villages	6,651	4,883	1,103,725	83,830	4,025	1,191,580	24,263	3 65	20.4
HURON :									
Ashfield	3,356	63,661	1,687,830	8,300	.....	1,696,130	12,372	3 69	7.3
Colborne	1,719	34,164	1,072,935	4,200	.....	1,077,135	7,438	4 33	6.9
Goderich	2,549	52,278	1,494,895	.....	.....	1,494,895	9,512	3 73	6.4
Grey	3,474	64,833	1,712,775	6,000	.....	1,718,775	12,589	3 62	7.3
Hay	3,416	52,599	1,758,375	22,050	1,000	1,781,425	13,701	4 01	7.7
Howick	4,185	67,456	2,129,475	9,750	300	2,139,525	13,012	3 11	6.1
Hullett	2,767	53,474	1,975,870	3,450	800	1,980,120	12,402	4 48	6.3
McKillop	2,840	51,969	1,899,600	.....	.....	1,899,600	9,813	3 46	5.2

* Separated from county for municipal purposes.

POPULATION, ASSESSMENT AND TAXATION.—Continued.

Municipalities.	Popula- tion.	No. of acres assessed	Assessed value.				Taxes imposed for all purposes.		
			Real property.	Per- sonal prop- erty.	Taxable income.	Total.	Total.	Per head.	Mill- on \$
			\$	\$	\$	\$	\$	\$ c.	
HURON.—Continued.									
Morris	2,582	55,161	1,723,960	3,500	.....	1,727,460	8,486	3 29	4 9
Stanley	2,205	43,318	1,660,210	2,200	.....	1,662,410	9,644	4 37	5 8
Stephen	4,100	56,742	1,796,125	6,808	.....	1,802,933	13,263	3 23	7 4
Tuckersmith	2,472	40,737	1,941,945	5,300	1,200	1,948,445	9,850	3 98	5 1
Turnberry	2,291	35,701	1,033,340	2,500	.....	1,035,840	6,366	2 78	6 1
Usborne	2,365	42,678	1,814,300	6,150	300	1,820,750	10,352	4 38	5 7
Wawanosh, E.	1,944	41,734	1,068,090	1,400	.....	1,069,490	6,467	3 33	6 0
Wawanosh, W.	1,999	41,710	1,111,450	7,650	200	1,119,300	7,137	3 57	6 4
Total townships ...	44,264	798,215	25,881,175	89,250	3,800	25,974,233	162,404	3 67	6 3
Clinton	2,447	900	561,385	26,250	7,950	595,585	12,620	5 17	21 2
Goderich	4,044	1,000	1,022,380	54,525	27,100	1,104,005	28,199	6 97	25 5
Seaforth	2,419	550	578,910	56,150	10,400	645,460	15,652	6 47	24 2
Wingham	2,166	650	463,970	55,130	7,800	526,400	12,282	5 67	23 3
Total towns	11,076	3,100	2,626,645	192,055	52,750	2,871,450	68,753	6 21	23 9
Bayfield	699	1,760	86,356	2,910	200	89,496	1,348	1 93	15 1
Blythe	906	429	186,030	19,075	1,300	206,405	4,372	4 83	21 2
Brussels	1,067	422	267,565	32,800	3,200	303,565	5,746	5 39	18 9
Exeter	1,809	1,031	451,050	44,425	3,700	499,175	7,991	4 42	16 0
Hensall	898	430	191,410	12,990	.....	204,400	2,995	3 34	14 7
Wroxeter	425	485	101,661	9,175	100	110,936	1,215	2 86	11 0
Total villages	5,804	4,557	1,284,072	121,405	8,500	1,413,977	23,667	4 08	16 7
BRUCE:									
Albemarle	1,316	54,155	170,732	.....	.....	170,732	5,353	4 07	31 4
Amabel	3,054	63,775	639,870	3,200	.....	643,070	12,952	4 24	20 1
Arran	2,518	54,086	1,448,035	1,200	.....	1,449,235	9,904	3 93	6 9
Brant	3,974	69,679	1,980,700	7,900	800	1,989,400	13,014	3 27	6 5
Bruce	3,120	66,306	1,373,300	3,300	.....	1,376,600	9,486	3 04	6 9
Carrick	4,881	59,417	2,064,575	16,800	800	2,082,175	13,307	2 73	6 4
Culross	2,866	56,560	1,399,830	3,550	.....	1,703,380	8,807	3 07	5 2
Eastnor	1,641	47,784	193,620	5,300	.....	198,920	6,125	3 73	30 8
Elderslie	2,233	54,419	1,289,210	1,200	.....	1,290,410	10,934	4 90	8 5
Greenock	2,782	63,523	1,344,390	36,100	.....	1,380,490	9,075	3 26	6 6
Huron	3,463	57,933	1,488,050	10,650	3,300	1,502,000	12,214	3 53	8 1
Kincardine	2,677	59,205	1,566,240	5,055	100	1,571,395	9,410	3 52	6 0
Kinloss	2,451	46,159	1,126,030	5,850	400	1,132,280	8,108	3 31	7 2
Lindsay & St. Edmunds	936	77,606	83,305	8,475	.....	91,780	3,116	3 33	34 0
Saugeen	1,518	36,057	840,120	900	.....	841,020	4,921	3 24	5 9
Total townships	39,430	866,664	17,308,007	109,480	5,400	17,422,887	136,726	3 47	7 8
Kincardine	2,208	1,900	545,528	30,600	12,550	588,678	16,616	7 53	28 2
Walkerton	3,046	1,350	582,130	54,975	16,350	653,655	16,222	5 33	24 8
Warton	2,262	732	376,870	19,900	4,500	401,270	10,031	4 43	25 0
Total towns	7,516	3,982	1,504,528	105,475	33,600	1,643,603	42,869	5 70	26 1
Chesley	1,745	500	314,450	22,050	12,750	349,250	8,499	4 87	24 3
Lucknow	1,008	500	276,406	39,625	.....	316,031	6,701	6 65	21 2
Paisley	1,059	500	257,130	39,200	700	297,030	5,653	5 34	19 0
Port Elgin	1,411	600	270,814	25,050	1,900	297,764	6,010	4 26	20 2
Southampton	1,603	3,000	230,414	9,350	.....	239,764	6,567	3 47	23 2
Tara	676	500	176,195	43,525	1,700	221,420	2,469	3 65	11 2
Teeswater	918	474	217,710	25,550	400	243,660	4,316	4 70	17 7
Tiverton	465	500	69,620	3,500	1,000	74,120	1,532	3 29	20 7
Total villages.	8,885	6,574	1,812,739	207,850	18,450	2,039,039	40,747	4 50	20 0

POPULATION, ASSESSMENT AND TAXATION.—Continued.

Municipalities.	Popula- tion.	No. of acres assessed	Assessed value.				Taxes imposed for all purposes.		
			Real property.	Per- sonal prop- erty.	Taxable income.	Total.	Total.	Per head.	Mills on \$
			\$	\$	\$	\$	\$	\$ c.	
GREY:									
Artemesia.....	3,442	68,630	1,011,670	3,300	.....	1,014,970	12,209	3 55	12.0
Bentnick.....	4,493	75,120	1,330,050	10,050	.....	1,340,100	15,353	3 42	11.5
Collingwood.....	3,473	68,000	1,370,411	3,050	.....	1,373,461	15,030	4 33	10.9
Derby.....	1,988	40,275	778,450	.....	.....	778,450	6,729	3 38	8.6
Egremont.....	2,955	72,584	1,539,050	7,500	100	1,546,650	10,320	3 49	6.7
Euphrasia.....	5,171	72,000	1,290,020	3,800	400	1,294,220	10,615	3 35	8.2
Glenelg.....	2,707	67,448	658,867	.....	1,050	659,917	8,850	3 27	13.4
Holland.....	3,278	68,191	766,720	6,700	750	774,170	7,612	2 32	9.8
Keppel.....	3,410	89,134	676,385	3,700	.....	680,085	11,624	3 41	17.1
Normanby.....	4,466	68,139	1,472,280	10,125	.....	1,482,405	13,184	2 95	8.9
Osprey.....	3,281	69,678	799,090	.....	.....	799,090	6,959	2 12	8.7
Proton.....	3,065	81,200	809,775	2,000	.....	811,775	9,439	3 08	11.6
St. Vincent.....	2,877	63,064	1,405,062	.....	.....	1,405,062	10,791	3 75	7.7
Sarawak.....	1,120	10,851	248,646	.....	.....	248,646	4,199	3 75	16.9
Sullivan.....	3,517	73,103	1,155,925	20,225	.....	1,176,150	10,029	2 85	8.5
Sydenham.....	3,489	73,215	1,149,950	1,300	400	1,151,650	11,428	3 28	9.9
Total townships.....	50,732	1,060,632	16,462,351	71,750	2,700	16,536,801	164,371	3 24	9.9
Durham.....	1,252	1,100	267,922	34,050	5,600	307,572	6,309	5 04	20.5
Meaford.....	1,832	1,500	504,927	31,950	3,850	540,727	11,318	6 18	20.9
Owen Sound.....	8,120	6,120	2,414,849	131,050	49,600	2,595,499	57,151	7 04	22.0
Thornbury.....	850	900	223,459	5,800	.....	229,259	4,357	5 13	19.0
Total towns.....	12,054	9,620	3,411,157	202,850	59,050	3,673,057	79,135	6 57	21.5
Dundalk.....	729	440	115,565	6,100	.....	121,665	2,259	3 10	18.6
Markdale.....	810	950	155,165	14,000	1,950	171,115	2,053	2 53	12.0
Total villages.....	1,539	1,390	270,730	20,100	1,950	292,780	4,312	2 80	14.7
SIMCOE									
Adjala.....	2,085	45,812	818,425	2,600	1,800	852,825	7,452	3 57	8.7
Floss.....	4,010	67,788	1,294,249	2,300	.....	1,296,549	13,099	3 27	10.1
Flos.....	3,451	63,499	661,097	7,350	1,300	669,747	12,959	3 76	19.3
Gwillimbury, W.....	2,467	46,891	1,043,002	1,925	.....	1,044,927	7,907	3 21	7.6
Innisfil.....	3,886	68,427	1,374,099	.....	.....	1,374,099	14,251	3 67	10.4
Matchedash.....	465	18,433	55,525	.....	.....	55,525	899	1 93	16.2
Medonte.....	3,876	64,217	527,550	4,450	.....	532,000	10,756	2 78	20.2
Nottawasaga.....	5,343	90,052	2,057,780	.....	.....	2,057,780	18,555	3 47	9.0
Orillia.....	3,562	71,146	565,665	200	1,100	566,965	10,212	2 87	18.0
Oro.....	4,139	73,243	1,047,443	3,300	1,200	1,051,943	10,945	2 64	10.4
Sunnidale.....	2,223	54,945	451,191	4,000	.....	455,191	8,661	3 90	19.0
Tay.....	3,861	46,604	520,989	9,100	3,450	533,539	9,793	2 54	18.4
Tecumseth.....	3,447	65,983	1,683,005	2,600	.....	1,690,605	16,032	4 65	9.5
Tiny.....	3,913	78,058	632,812	2,300	.....	635,112	12,428	3 18	19.6
Tossoronto.....	1,581	44,656	730,124	2,200	100	732,424	6,654	4 21	9.1
Vespra.....	2,967	62,060	494,388	1,000	.....	495,388	8,846	2 98	17.9
Total townships.....	51,276	961,814	13,992,294	43,325	8,950	14,044,569	169,449	3 30	12.1
Alliston.....	1,805	500	299,273	21,355	3,500	324,128	7,281	4 03	22.5
Barrie.....	5,498	2,100	1,444,048	68,450	55,080	1,567,578	39,462	7 18	25.2
Collingwood.....	5,514	4,400	1,235,065	26,100	11,450	1,272,615	36,657	6 65	28.8
Midland.....	2,417	469	447,060	8,700	.....	455,760	10,027	4 14	22.0
Orillia.....	4,784	1,601	1,205,935	108,300	22,250	1,336,485	31,168	6 52	23.3
Penetanguishene.....	2,439	1,717	412,100	21,500	1,150	434,750	10,489	4 30	24.1
Wainwright.....	1,178	1,146	200,925	9,750	.....	210,675	3,868	3 28	18.4
Total towns.....	23,635	11,932	5,244,406	264,155	93,430	5,601,991	138,952	5 88	24.8
Beeton.....	750	475	119,970	10,700	.....	130,670	2,786	3 71	21.3
Bradford.....	976	1,700	229,248	17,800	.....	247,048	5,323	5 45	21.5

POPULATION, ASSESSMENT AND TAXATION.—Continued.

Municipalities.	Popula- tion.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Per- sonal prop- erty.	Taxable income.	Total.	Total.	Per head.	Mills on \$
			\$	\$	\$	\$	\$	\$ c.	
SIMCOE.—Continued.									
Creemore	602	503	115,880	7,050		122,930	2,223	3 69	18.1
Tottenham	544	400	111,280	12,500		123,780	2,043	3 76	16.5
Total villages	2,872	3,078	576,378	48,050		624,428	12,375	4 31	19.8
MIDDLESEX:									
Adelaide	2,040	44,208	867,815			867,815	12,229	5 99	14.1
Biddulph	2,327	39,209	1,215,125	1,350	200	1,216,675	10,090	4 34	8.3
Caradoc	3,902	61,899	1,195,346	2,200		1,197,546	17,927	4 59	15.0
Delaware	1,524	23,379	588,075	1,950	700	590,725	9,871	6 48	16.7
Dorchester, N	3,575	51,585	1,692,202			1,692,202	16,884	4 72	10.0
Ekfrid	2,728	53,437	1,985,365	33,600		2,018,965	18,720	6 86	9.3
Lobo	2,721	47,284	1,752,850	1,600		1,754,450	15,836	5 82	9.0
London	8,803	99,877	4,149,480		2,700	4,152,180	36,995	4 20	8.9
McGillivray	2,846	66,930	2,021,195			2,021,195	14,994	5 27	7.4
Metcalfe	1,532	36,191	1,000,745	1,250		1,001,995	12,786	8 35	12.8
Mosa	2,747	47,201	577,810	100		577,910	11,743	4 27	20.3
Nissouri, W	2,610	49,600	1,469,367	500		1,469,867	14,484	5 55	9.9
Westminster	4,678	63,080	3,004,730			3,004,730	22,917	4 90	7.6
Williams, E	1,449	38,584	1,232,917	1,925	900	1,235,742	8,922	6 16	7.2
Williams, W	1,488	35,123	604,740			604,740	7,690	5 35	12.7
Total townships	44,920	757,487	23,357,762	44,475	4,500	23,406,737	232,108	5 17	9.9
Parkhill	1,568	600	234,080	27,710	2,600	314,390	8,983	5 73	28.6
Strathroy	3,066	2,200	870,245	57,190	10,350	937,785	20,347	6 64	21.7
Total towns	4,634	2,800	1,154,325	84,900	12,950	1,252,175	29,330	6 33	23.4
Ailsa Craig	766	443	131,125			131,125	2,459	3 21	18.8
Glencoe	1,019	429	262,540	17,950	3,500	283,990	5,232	5 13	18.4
Lucan	823	450	162,020	6,900		168,920	3,100	3 77	18.4
Newbury	405	500	59,325	2,650		61,975	1,324	3 27	21.4
Wardsville	338	420	54,871	4,600	100	59,571	1,211	3 58	20.3
Total villages	3,351	2,242	669,881	32,100	3,600	705,581	13,326	3 98	18.9
OXFORD:									
Blandford	1,661	29,670	1,069,510	3,900	300	1,073,710	7,877	4 74	7.3
Blenheim	4,809	66,970	2,280,505	12,200	1,450	2,294,155	20,312	4 22	8.9
Dereham	3,501	65,066	2,366,860	9,650	700	2,377,210	21,168	6 05	8.9
Nissouri, E	2,698	46,472	2,107,215	8,600	1,900	2,117,715	11,454	4 25	5.4
Norwich, N	2,263	33,859	1,505,805	11,050		1,516,855	10,507	4 64	6.9
Norwich, S	2,644	36,083	954,060	37,300	900	992,260	9,569	3 62	9.6
Oxford, E	2,004	34,743	1,479,805	900	150	1,480,855	8,274	4 13	5.6
Oxford, N	1,272	21,133	889,577	1,000	1,000	871,577	6,075	4 78	7.0
Oxford, W	2,026	25,856	1,066,760	300		1,067,060	7,554	3 73	7.1
Zorra, E	4,030	57,531	2,691,230	8,200	2,450	2,701,880	21,576	5 35	8.0
Zorra, W	2,601	55,124	2,582,795	1,200		2,583,995	15,663	6 02	6.1
Total townships	29,509	472,507	18,974,122	94,300	8,850	19,077,272	140,029	4 75	7.3
Ingersoll	4,623	2,200	1,354,460	47,500	21,850	1,423,810	34,045	7 36	23.9
Tilsenburg	2,250	1,900	669,100	60,200	1,850	731,150	15,897	7 07	21.7
Woodstock	9,110	1,525	2,568,871	127,971	44,050	2,740,892	63,314	6 95	23.1
Total towns	15,983	5,625	4,592,431	235,671	67,750	4,895,852	113,256	7 09	23.1
Embro	626	1,343	184,393	7,500	2,300	194,193	2,567	4 10	13.2
Norwich	1,291	500	280,795	26,900	5,300	312,995	6,828	5 29	21.8
Total villages	1,917	1,843	465,188	34,400	7,600	507,188	9,395	4 90	13.5

POPULATION, ASSESSMENT AND TAXATION.—Continued.

Municipalities.	Popula- tion.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Per- sonal prop- erty.	Taxable income.	Total.	Total.	Per head.	Mills on \$
BRANT :			\$	\$	\$	\$	\$	\$ c.	
Brantford	5,212	71,558	3,719,465	71,930	5,800	3,797,195	21,835	4 19	5.8
Burford	4,347	66,459	2,198,330	66,875	3,100	2,268,305	19,440	4 47	8.6
Dumfries, S.	2,588	46,744	2,288,963	29,300	3,550	2,321,813	12,834	4 96	5.5
Oakland	737	10,384	390,170	12,600	400	403,170	3,246	4 40	8.1
Onondaga	1,128	20,567	703,646	.....	.....	703,646	5,539	4 91	7.9
Total townships	14,012	215,712	9,300,574	180,705	12,850	9,494,129	62,894	4 49	6.6
Paris (town)	3,045	685	913,053	92,449	15,700	1,021,202	19,196	6 30	18.8
PERTH :									
Blanshard	2,672	45,908	2,098,650	1,700	.....	2,100,350	12,551	4 70	6.0
Downie	2,809	48,561	2,069,450	.....	800	2,070,250	12,189	4 34	5.9
Easthope, N.	2,267	43,106	1,921,110	2,500	1,300	1,924,910	12,520	5 52	6.5
Easthope, S.	1,909	23,805	1,138,242	3,100	.....	1,141,342	7,417	3 89	6.5
Ellice	3,367	54,466	1,618,097	.....	.....	1,618,097	17,278	5 13	10.7
Elma	3,847	67,019	1,601,935	.....	.....	1,601,935	19,838	5 16	12.4
Fullarton	2,218	40,289	1,900,000	.....	.....	1,900,000	12,654	5 71	6.7
Hibbert	2,177	41,488	1,589,430	6,300	.....	1,595,730	9,259	4 25	5.8
Logan	2,828	53,774	1,873,668	.....	.....	1,873,668	12,912	4 57	6.9
Mornington	3,009	50,082	1,753,825	.....	.....	1,753,825	16,197	5 38	9.2
Wallace	2,773	49,952	1,941,918	2,550	.....	1,944,468	11,537	4 16	5.9
Total townships	29,876	518,450	19,506,325	16,150	2,100	19,524,575	144,352	4 83	7.4
Listowel	2,525	1,500	682,000	64,550	9,550	756,100	20,480	8 11	27.1
Mitchell	2,133	1,200	607,753	67,700	4,850	680,303	13,738	6 44	20.2
*St. Marys	3,203	2,678	1,061,645	84,250	23,510	1,169,405	22,203	6 93	19.0
Total towns	7,861	5,378	2,351,398	216,500	37,910	2,605,808	56,421	7 18	21.7
Milverton (village)....	627	470	125,950	8,005	.....	133,955	2,244	3 58	16.8
WELLINGTON :									
Arthur	2,864	64,442	1,294,845	750	.....	1,295,595	10,536	3 68	8.1
Eramosa	2,628	44,117	1,794,770	44,750	.....	1,839,520	9,898	3 77	5.4
Erin	3,297	70,349	1,996,535	40,200	200	2,036,935	12,003	3 64	5.9
Garafraza, W.	2,647	47,596	1,604,850	3,200	200	1,608,250	10,628	4 02	6.6
Guelph	2,274	36,689	1,465,100	24,500	10,150	1,499,750	9,139	4 02	6.1
Luther, W.	2,151	49,823	843,650	1,100	.....	844,750	8,151	3 79	9.6
Maryborough	2,985	56,441	1,722,155	7,050	.....	1,729,205	12,876	4 31	7.4
Minto	3,079	69,433	1,848,890	.....	.....	1,848,890	11,540	3 75	6.2
Nichol	1,821	26,686	1,058,710	20,725	.....	1,079,435	6,776	3 72	6.3
Peel	3,881	74,409	1,888,466	.....	.....	1,888,466	15,243	3 93	8.1
Pickington	1,466	29,145	1,043,001	.....	.....	1,043,001	7,019	4 79	6.7
Puslinch	3,522	58,504	1,403,615	37,810	1,800	1,443,225	10,575	3 00	7.3
Total townships	32,615	627,634	17,964,587	180,085	12,350	18,157,022	124,384	3 81	6.9
Harriston	1,780	850	391,125	27,775	2,400	421,300	8,321	4 95	20.9
Mount Forest	2,389	1,414	552,815	46,550	10,800	610,165	14,091	5 90	23.1
Palmerston	1,912	919	384,055	33,380	4,550	421,985	9,854	5 15	23.4
Total towns	6,081	3,183	1,327,995	107,705	17,750	1,453,450	32,766	5 39	22.5
Arthur	1,588	994	227,490	23,700	850	252,040	5,096	3 21	20.2
Clifford	640	435	114,430	9,325	150	123,905	1,526	2 38	12.3
Drayton	890	422	149,195	9,200	.....	158,395	3,526	3 96	22.3
Elora	1,293	850	300,769	21,600	3,000	325,369	7,772	6 01	23.9
Erin	495	463	104,605	8,700	.....	113,305	1,422	2 87	12.6
Fergus	1,614	980	382,156	25,500	2,950	410,606	7,928	4 91	19.3
Total villages	6,520	4,144	1,278,645	98,025	6,950	1,383,620	27,270	4 18	19.7

*Separated from county for municipal purposes.

POPULATION, ASSESSMENT AND TAXATION.—(Continued.)

Municipalities.	Popula- tion.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Per- sonal property	Taxable income.	Total.	Total.	Per head.	Mills on \$.
			\$	\$	\$	\$	\$	\$ c.	
WATERLOO :									
Dumfries, N.....	2,166	44,271	1,865,095	9,650	700	1,875,445	11,828	5 46	6.3
Waterloo.....	7,056	82,335	3,620,220	6,440	1,960	3,628,620	26,371	3 74	7.3
Wellesley.....	4,980	66,062	2,139,160			2,139,160	20,738	4 16	9.7
Wilnot.....	5,284	60,638	2,638,600	18,150	4,600	2,661,350	19,349	3 66	7.3
Woolwich.....	4,493	53,263	2,605,930	33,950	510	2,640,390	17,265	3 84	6.5
Total townships.....	23,979	306,569	12,869,005	68,190	7,770	12,944,965	95,551	3 98	7.4
Berlin.....	9,642	3,000	2,639,569	254,850	36,600	2,931,019	58,259	6 04	19.9
Galt.....	7,501	1,477	2,579,810	180,725	56,910	2,817,445	51,056	6 81	18.1
Waterloo.....	3,485	2,810	1,177,285	149,175	17,000	1,343,460	23,036	6 61	17.1
Total towns.....	20,628	7,287	6,396,664	584,750	110,510	7,091,924	132,351	6 42	18.7
Ayr.....	911	500	250,704	13,300	2,600	266,604	4,292	4 71	16.1
Elmira.....	1,089	517	281,135	22,100	1,150	304,385	3,335	3 06	11.0
Hespeler.....	2,521	560	520,990	22,600	3,400	546,990	7,904	3 14	14.4
New Hamburg.....	1,234	950	306,314	38,225	3,389	347,928	5,850	4 74	16.8
Preston.....	2,111	1,067	577,850	40,600	6,850	625,300	9,510	4 50	15.2
Total villages.....	7,866	3,594	1,936,993	136,825	17,389	2,091,207	30,891	3 93	14.8
DUFFERIN :									
Amaranth.....	2,576	63,429	1,063,810			1,063,810	12,248	4 75	11.5
Garafraxa, E.....	2,007	40,767	1,117,425	900		1,118,325	8,344	4 16	7.5
Luther, E.....	1,492	58,628	544,290	1,400		545,690	6,862	4 60	12.6
Melancthon.....	3,527	74,608	818,545	9,600		828,145	12,110	3 43	14.6
Mono.....	3,305	68,874	729,265	3,575		732,840	10,933	3 31	14.9
Mulmur.....	2,730	69,914	1,310,450	5,450		1,315,900	12,018	4 40	9.1
Total townships.....	15,637	356,210	5,583,785	20,925		5,604,710	62,515	4 00	12.2
Orangeville (town).....	3,206	1,511	751,085	25,450	10,600	787,135	17,328	5 40	22.0
*Grand Valley.....	739	264	115,180	10,600		125,780	2,356	3 19	18.7
Shelburne.....	1,228	500	344,560	700	5,400	350,660	6,494	5 29	18.5
Total villages.....	1,967	764	459,740	11,300	5,400	476,440	8,850	4 50	18.6
LINCOLN :									
Caistor.....	1,767	32,775	661,370		850	662,220	6,140	3 47	9.3
Clinton.....	1,934	24,739	989,908	48,440	861	1,039,209	10,105	5 22	9.7
Gainsborough.....	2,420	39,824	1,028,931	70,340		1,099,271	8,528	3 52	7.8
Grantham.....	1,892	19,137	731,190	10,200		741,390	8,192	4 33	11.0
Grimsby, N.....	1,194	15,679	817,085	18,455	1,300	836,840	7,199	6 03	8.6
Grimsby, S.....	1,375	18,136	564,383	14,058	400	578,841	6,337	4 61	10.9
Louth.....	1,773	18,738	704,275	8,000	1,100	713,375	9,310	5 25	13.1
Niagara.....	1,827	22,330	885,860		1,400	887,260	8,507	4 63	9.6
Total townships.....	14,192	191,358	6,383,002	169,493	5,911	6,558,406	64,318	4 53	9.8
Niagara (town).....	1,266	591	482,235	13,550	400	496,185	9,924	7 84	20.0
Beamsville.....	854	516	167,350	14,550	400	182,300	3,864	4 52	21.1
Grimsby.....	1,034	491	206,080	8,275	1,200	215,555	4,364	4 22	20.2
Merrittion.....	1,684	377	629,525	27,150	8,600	665,275	13,820	8 21	20.8
Port Dalhousie.....	1,011	400	165,020			165,020	4,126	4 08	25.0
Total villages.....	4,583	1,784	1,167,975	49,975	10,200	1,228,150	26,174	5 71	21.3

* Incorporated in 1898.

POPULATION, ASSESSMENT AND TAXATION.—Continued.

Municipalities.	Popula- tion.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Per- sonal prop- erty.	Taxable income.	Total.	Total.	Per head.	Mills on \$.
			\$	\$	\$	\$	\$	\$ c.	
WENTWORTH:									
Ancaster	3,758	45,897	2,202,795	7,850	900	2,211,545	13,352	3 55	6.0
Barton	3,552	13,235	1,280,265		2,700	1,282,965	11,541	3 25	9.0
Beverly	4,036	69,969	1,984,867	5,950		1,990,817	13,802	3 40	6.9
Binbrook	1,436	26,440	968,870	2,300	800	971,970	6,032	4 20	6.2
Flamboro, E.	2,533	33,837	1,651,020	7,200	3,900	1,662,120	7,709	2 98	4.6
Flamboro, W.	2,443	31,396	1,274,290	5,300	1,800	1,281,390	10,529	4 31	8.2
Stanford	1,605	23,557	1,049,503	14,050	2,100	1,065,655	5,035	3 14	4.7
Saltfleet	3,036	28,300	1,727,086	40,525	500	1,768,111	10,851	3 57	6.1
Total townships	22,469	272,631	12,138,698	83,175	12,700	12,234,573	78,851	3 51	6.4
Dundas (town)	3,149	550	744,250	93,500	30,200	867,950	20,911	6 64	24.1
Waterdown (village) ..	622	357	173,425	7,300	500	181,225	1,708	2 75	9.4
HALTON:									
Esquesing	3,586	66,704	2,237,541	34,345	3,100	2,274,986	12,139	3 39	5.3
Nassagaweya	2,454	44,799	975,230	11,040	3,750	990,000	7,850	3 20	7.9
Nelson	2,912	46,317	1,787,345	3,200		1,790,545	10,962	3 76	6.1
Trafalgar	3,623	67,038	2,464,525	2,650	2,200	2,469,375	15,041	4 15	6.1
Total townships	12,575	224,838	7,464,641	51,235	9,030	7,524,906	45,992	3 66	6.1
Milton	1,214	400	378,865	23,450	5,900	408,215	6,736	5 55	16.5
Oakville	1,700	1,300	448,402	10,900	2,400	461,702	10,897	6 41	23.6
Total towns	2,914	1,700	827,267	34,350	8,300	869,917	17,633	6 05	20.3
Acton	1,396	240	260,765	19,850	800	281,415	4,936	3 54	17.5
Burlington	1,274	489	356,525	7,500		364,025	4,442	3 49	12.2
Georgetown	1,461	1,093	309,155	30,150	2,950	342,255	7,081	4 85	20.7
Total villages	4,131	1,822	926,445	57,500	3,750	987,695	16,459	3 98	16.6
PEEL:									
Albion	2,690	55,870	1,151,300	2,200		1,153,500	9,550	3 55	8.3
Caledon	3,948	68,233	1,788,910	7,450		1,796,360	13,683	3 47	7.6
Chinguacousy	4,023	80,043	2,911,050	2,950		2,914,000	17,925	4 46	6.2
Toronto	4,991	65,086	2,702,495	6,650	4,600	2,713,745	21,635	4 33	8.0
Toronto Gore	1,005	19,001	734,530	500		735,030	5,230	5 20	7.1
Total townships	16,657	288,233	9,288,285	19,750	4,600	9,312,635	68,023	4 08	7.3
Brampton (town)	2,835	1,202	939,210	47,800	17,850	1,004,860	24,506	8 64	24.4
Bolton	635	476	141,225	9,450	1,500	152,175	2,328	3 67	15.3
Streetsville	611	504	147,895	13,250	50	161,195	2,144	3 51	13.3
Total villages	1,246	980	289,120	22,700	1,550	313,370	4,472	3 59	14.3
YORK:									
Etobicoke	3,578	29,383	1,853,915	14,245	1,600	1,869,760	19,905	5 56	10.6
Georgina	1,662	35,045	645,700	1,200		646,900	5,438	3 27	8.4
Gwillimbury, E.	3,364	58,549	1,272,000			1,272,000	11,480	3 41	9.0
Gwillimbury, N.	1,388	31,569	745,603	2,400		748,000	5,422	3 91	7.2
King	5,170	87,445	2,750,045	16,600	800	2,767,445	19,413	3 75	7.0
Markham	5,263	66,881	3,194,465	17,600	2,600	3,214,665	21,324	4 05	6.6
Scarborough	3,745	42,907	2,077,725	4,300	2,400	2,084,425	15,520	4 10	7.4

POPULATION, ASSESSMENT AND TAXATION. - *Continued.*

Municipalities.	Population.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Per- sonal prop- erty.	Taxable income.	Total.	Total.	Per head.	Mills on \$.
			\$	\$	\$	\$	\$	\$ c.	
YORK — Continued.									
Vaughan	4,308	66,678	2,929,705	7,850	.....	2,937,055	20,410	4 74	6.9
Whitchurch	3,643	60,018	1,601,035	2,800	500	1,604,335	11,653	3 20	7.3
York	8,170	58,000	5,768,078	.....	6,905	5,774,983	83,032	10 16	14.4
Total townships	40,331	536,475	22,838,268	66,495	14,805	22,919,568	213,597	5 30	9.3
Aurora	1,196	1,100	407,281	10,450	1,000	418,731	8,364	5 59	20.0
Newmarket	2,210	699	471,665	27,700	7,050	506,415	12,291	5 56	24.3
† North Toronto	1,632	2,500	883,108	.....	.....	885,108	17,647	10 81	19.9
* Toronto Junction	5,355	1,608	1,638,685	70,100	2,800	1,711,585	47,311	8 83	27.6
Total towns	10,693	5,907	3,402,739	108,250	10,850	3,521,839	85,613	8 01	24.3
East Toronto	1,559	500	579,580	4,000	.....	583,580	12,037	7 72	20.6
Holland Landing	444	1,956	70,490	500	.....	70,990	1,057	2 38	14.9
Markham	1,075	478	221,575	9,150	3,850	234,575	4,953	4 61	21.1
Richmond Hill	570	463	152,075	3,600	600	156,275	2,515	4 41	16.1
Stouffville	1,289	385	305,825	13,800	1,500	321,125	4,885	3 79	15.2
Sutton	638	489	125,175	3,650	.....	128,825	1,685	2 64	13.1
Weston	930	191	260,200	9,200	3,300	272,700	4,432	4 77	16.3
Woodbridge	630	500	101,575	650	.....	102,225	1,580	2 51	15.5
Total villages	7,135	4,962	1,816,495	44,550	9,250	1,870,295	33,144	4 65	17.7
ONTARIO :									
Brook	3,735	66,040	2,076,018	7,900	.....	2,083,918	14,141	3 79	6.8
Mara	2,954	61,334	931,975	17,200	2,150	951,326	10,471	3 54	11.0
Pickering	5,446	71,412	3,407,562	17,900	2,200	3,427,662	22,816	4 19	6.7
Rama	1,328	33,327	151,077	2,340	.....	153,417	3,594	2 71	23.4
Reach	3,720	63,124	1,998,816	.....	.....	1,998,816	13,010	3 51	6.5
Scott	2,233	49,297	1,022,180	.....	.....	1,022,180	7,702	3 45	7.5
Scugog	524	9,246	286,875	.....	.....	286,875	1,748	3 34	6.1
Thorah	1,398	31,080	541,450	.....	.....	541,450	4,771	3 41	8.8
Uxbridge	2,757	51,889	992,665	3,850	.....	996,515	10,762	3 90	10.8
Whitby, E	2,646	31,175	1,620,420	34,050	2,700	1,637,170	8,950	3 38	5.4
Whitby	2,170	30,611	1,493,020	33,250	400	1,526,670	10,043	4 63	6.6
Total townships	28,911	498,535	14,522,059	116,490	7,450	14,645,999	108,038	3 74	7.4
Oshawa	4,135	2,400	1,000,000	48,000	22,300	1,070,300	22,722	5 50	21.2
Uxbridge	1,783	500	479,100	42,450	6,650	528,200	10,610	5 95	20.1
Whitby	2,418	3,800	808,892	45,050	16,110	870,052	19,483	8 06	22.4
Total towns	8,336	6,700	2,287,992	135,500	45,060	2,468,552	52,815	6 34	21.4
Beaverton	778	433	150,740	4,350	.....	155,090	2,845	3 66	18.3
Cannington	1,298	477	262,930	14,700	.....	277,630	4,152	3 20	15.0
Port Perry	1,494	500	336,010	40,750	2,550	379,310	8,964	6 00	23.6
Total villages	3,570	1,410	749,680	59,800	2,550	812,030	15,961	4 47	19.7
DURHAM :									
Cartwright	1,853	37,820	692,185	27,050	1,000	720,235	5,746	3 10	8.0
Cavan	2,574	62,926	1,557,750	1,600	.....	1,559,350	10,803	4 20	6.9
Clarke	4,146	68,363	1,818,335	6,475	.....	1,824,810	19,352	4 67	10.6
Darlington	4,286	68,565	2,426,705	3,050	700	2,430,455	16,577	3 87	6.8

* Separated from county for municipal purposes.

† Separated from county for municipal purposes in 1899.

POPULATION, ASSESSMENT AND TAXATION.--Continued.

Municipalities.	Popula- tion.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Per- sonal property.	Taxable income.	Total.	Total.	Per head.	Mills on \$.
			\$	\$	\$	\$	\$	\$ c.	
DURHAM.—Continued.									
Hope	3,445	63,907	2,294,659	2,500	8,400	2,305,559	10,155	2 95	4.4
Manvers	2,976	69,660	840,840	5,250		846,090	10,025	3 57	11.8
Total townships ..	19,280	371,241	9,630,474	45,925	10,100	9,686,499	72,658	3 77	7.5
Bowmanville	2,930	3,400	985,180	90,630	20,530	1,096,340	23,943	8 17	21.8
Port Hope	4,403	1,007	1,265,595	124,050	52,800	1,442,445	29,967	6 51	20.8
Total towns	7,333	4,407	2,250,775	214,680	73,330	2,538,785	53,910	7 35	21.2
Millbrook	937	436	171,118	11,625	1,200	183,943	2,938	3 14	16.0
Newcastle	582	1,640	190,164	1,575	800	192,639	3,859	6 63	20.0
Total villages	1,519	2,076	361,282	13,200	2,000	376,482	6,797	4 47	18.1
*NORTHUMBERLAND:									
Albion	1,116	16,941	333,200	1,800	1,400	336,400	3,030	2 72	9.0
Brighton	2,602	47,907	1,180,855	700	2,900	1,184,455	8,780	3 37	7.4
Cramahe	2,532	46,600	1,091,965	1,600		1,093,565	8,659	3 42	7.9
Haldimand	4,041	77,048	1,718,455		750	1,719,205	14,745	3 65	8.6
Hamilton	4,075	62,313	2,104,910	11,650	3,200	2,119,760	14,014	3 44	6.6
Monaghan, S.	942	18,324	538,470	4,900	400	543,770	4,013	4 26	7.4
Murray	2,747	48,173	1,164,975	21,300	300	1,186,575	9,631	3 51	8.1
Percy	3,147	51,081	956,125	9,900	3,100	969,125	10,944	3 48	11.3
Seymour	3,085	66,743	1,127,395	1,050		1,128,445	12,724	4 12	11.3
Total townships	24,287	435,130	10,216,350	52,900	12,050	10,281,300	86,540	3 56	8.4
Cobourg (town)	4,207	2,417	1,223,750	89,200	23,050	1,336,000	35,959	8 55	26.9
Brighton	1,389	2,737	411,230	26,225	350	437,805	5,778	4 16	13.2
Campbellford	2,362	600	692,903	32,550	12,600	738,053	12,548	5 31	17.0
Colborne	1,056	1,092	280,490	8,100	1,920	290,510	4,857	4 41	16.0
Hastings	803	557	166,910	6,125	1,200	174,235	3,541	4 41	20.3
Total villages	5,610	4,986	1,551,533	73,000	16,070	1,640,603	26,524	4 73	16.2
PRINCE EDWARD:									
Ameliasburg	2,976	43,598	1,126,660			1,126,660	10,621	3 57	9.4
Athol	1,137	23,621	480,226		600	480,825	3,934	3 46	8.2
Hallowell	2,877	43,696	1,107,935	11,325		1,119,260	10,335	3 59	9.2
Hillier	1,621	31,531	737,365	1,950		739,315	6,803	4 20	9.2
Marysburg, N.	1,035	23,585	473,320	21,225	400	494,945	3,767	3 64	7.6
Marysburg, S.	1,279	23,475	348,045	990	1,250	350,285	3,983	3 08	11.2
Sophiasburg	1,903	43,001	1,006,044	3,900	900	1,010,844	7,454	3 92	7.4
Total townships	12,828	232,507	5,279,594	39,390	3,150	5,322,134	46,847	3 65	8.8
Picton (town)	3,485	552	1,183,765	75,400	18,200	1,277,365	21,857	6 27	17.1
Wellington (village) ..	647	1,524	193,300		2,550	195,850	1,959	3 03	10.0
LENNOX AND ADDINGTON:									
Adolphustown	413	11,517	340,120	3,600	500	344,220	2,913	7 05	8.5
Amherst Island	868	14,652	345,280	3,200	600	349,080	3,331	3 84	9.5
Camden East	3,980	86,477	1,390,745	19,350	5,100	1,415,195	19,309	4 85	13.6
Denbigh, etc.	1,034	45,396	56,201			56,201	1,724	1 07	30.7
Ernestown	3,367	61,373	1,466,385	2,700	800	1,469,885	14,332	4 26	9.7
Fredericksburg, N.	1,598	23,145	729,235	19,260		748,495	7,478	4 68	10.0
Fredericksburg, S.	1,082	20,190	568,135	1,000	800	569,935	5,342	4 94	9.4
Kaladar, Anglesea, etc.	1,289	57,051	68,880			68,880	2,499	1 94	16.3
Richmond	2,267	50,015	858,295			858,295	9,799	4 32	11.4

* United to Durham for municipal purposes.

POPULATION, ASSESSMENT AND TAXATION.—Continued

Municipalities.	Popula- tion.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Per- sonal prop- erty.	Taxable income.	Total.	Total.	Per head.	Mills on \$.
LENNOX AND ADDINGTON.			\$	\$	\$	\$	\$	\$ c.	
—Continued.									
Sheffield	2,022	69,614	662,430	13,650	.....	676,080	7,848	3 88	11.6
Total townships	17,920	439,430	6,485,706	62,760	7,800	6,556,266	74,575	4 16	11.4
Napanee (town)	3,121	372	861,192	26,200	23,110	910,502	24,984	8 01	27.4
Bath	437	2,268	100,697	3,225	1,600	105,522	1,788	4 09	16.9
Newburgh	635	3,200	104,305	.....	1,950	106,255	3,722	5 86	35.0
Total villages	1,072	5,468	205,002	3,225	3,550	211,777	5,510	5 14	26.0
FRONTENAC :									
Barrie	592	25,346	43,383	.....	.....	43,383	1,448	2 45	33.4
Bedford	1,411	63,433	175,987	.....	.....	175,987	4,908	3 48	27.9
Clarendon and Miller..	766	46,508	75,088	.....	500	75,588	2,014	2 63	26.6
Hinchinbrooke	1,361	65,544	181,882	1,800	.....	183,682	4,384	3 22	23.9
Howe Island	323	8,025	52,755	.....	.....	52,755	1,515	4 69	28.7
Kennebec	1,311	41,023	95,822	.....	.....	95,822	3,086	2 35	32.2
Kingston	3,034	51,871	1,114,357	.....	.....	1,114,357	14,103	4 65	12.7
Loughborough	1,867	51,096	379,935	1,125	400	381,460	7,131	3 82	18.7
Olden	972	51,218	94,288	.....	.....	94,288	3,794	3 90	40.2
Oso	1,068	41,904	76,212	326	.....	76,538	2,830	2 65	37.0
Palmers'n and Canonto	999	54,493	56,942	2,575	.....	59,517	2,663	2 67	44.7
Pittsburg	2,090	48,165	811,851	.....	.....	811,851	12,044	5 76	14.8
Portland	2,061	52,472	490,727	3,750	1,550	496,027	8,028	3 90	16.2
Storrington	1,880	55,774	421,675	.....	.....	421,675	8,032	4 27	19.0
Wolfe Island	1,483	30,787	590,373	3,000	.....	593,373	8,032	5 42	13.5
Total townships	21,218	687,699	4,661,277	12,576	2,450	4,676,303	84,012	3 96	18.0
Garden Island	326	77	29,800	20,000	6,000	55,800	1,515	4 65	27.2
Portsmouth	709	150	112,530	4,380	5,150	122,060	2,529	3 57	20.7
Total villages	1,035	227	142,330	24,380	11,150	177,860	4,044	3 91	22.7
LEEDS :									
Bastard and Burgess, S	2,812	56,168	745,010	500	600	746,110	10,206	3 63	13.7
Crosby N	1,763	42,845	351,562	5,400	1,900	358,862	6,243	3 54	17.4
Crosby S	1,678	36,771	388,155	800	750	389,705	6,187	3 69	15.9
Elizabethtown	3,693	76,936	1,381,727	.....	9,600	1,391,327	15,398	4 17	11.1
Elmsley, S	735	22,100	461,886	1,700	.....	463,586	2,902	3 95	6.3
Kitley	1,874	49,740	1,040,390	.....	300	1,040,690	7,080	3 78	6.8
Leeds and Lansd'wne, F	2,728	58,247	986,990	28,835	160	1,015,985	12,802	4 69	12.6
Leeds and Lansd'wne, R	2,196	44,363	559,510	8,950	.....	568,460	8,096	3 69	14.2
Yonge and Escott, Fr.	2,424	55,405	709,410	5,850	6,800	722,060	12,051	4 97	16.7
Yonge and Escott, Rr.	1,191	27,764	404,260	.....	300	404,560	6,237	5 23	15.4
Total townships	21,094	470,339	7,028,900	52,035	20,410	7,101,345	87,202	4 13	12.3
Brockville	8,841	1,243	3,206,078	187,900	42,290	3,436,178	81,228	9 19	23.6
Gananoque	3,388	1,204	1,046,295	45,100	.....	1,091,395	21,360	6 29	19.5
Total towns	12,229	2,447	4,252,373	233,000	42,200	4,527,573	102,528	8 38	22.6
Athens	989	500	173,445	.....	.....	173,445	3,430	3 47	19.8
Newboro	461	888	88,490	900	400	89,790	1,806	3 92	20.1
Total villages	1,450	1,388	261,935	900	400	263,235	5,236	3 61	19.9
*GRENVILLE :									
Augusta	4,028	74,754	1,388,675	.....	1,100	1,389,775	11,467	2 85	8.3
Edwardsburg	3,736	69,066	1,162,070	200	400	1,162,670	12,103	3 24	10.4

* Separated from county for municipal purposes.

* United to Leeds for Municipal purposes.

POPULATION, ASSESSMENT AND TAXATION.—Continued.

Municipalities.	Popu- lation.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real Property.	Per- sonal prop- erty.	Taxable income.	Total.	Total.	Per head.	Mills on \$
			\$	\$	\$	\$	\$	\$ c.	
GRENVILLE.—Continued.									
Gower S	739	21,756	314,880	300	.....	315,180	3,016	4 08	9.6
Oxford-on-Rideau	2,685	59,158	783,905	.....	1,500	785,405	9,124	3 40	11.6
Wolford.	1,825	46,315	929,479	.....	.....	929,479	5,693	3 12	6.1
Total townships	13,013	271,049	4,579,009	500	3,000	4,582,509	41,403	3 18	9.0
*Prescott (town)	2,714	1,182	816,940	32,150	11,200	860,290	15,670	5 77	18.2
Cardinal	1,310	400	288,946	28,675	6,600	324,221	4,132	3 15	12.7
Kemptville	1,377	366	277,675	24,600	3,200	305,475	6,117	4 49	20.0
Merrickville	902	730	266,740	20,675	13,175	300,590	3,908	4 33	13.0
Total villages	3,589	1,496	833,361	73,950	22,975	930,286	14,157	3 94	15.2
DUNDAS :									
Matilda	3,756	62,602	1,272,300	46,400	3,000	1,321,700	17,383	4 63	13.2
Mountain	3,106	57,479	1,371,950	6,200	650	1,378,800	12,839	4 13	9.3
Williamsburg	3,777	59,672	1,435,013	4,000	.....	1,439,013	11,363	3 01	7.9
Winchester	3,345	57,048	1,336,750	4,000	.....	1,340,750	19,956	5 97	14.9
Total townships	13,984	238,801	5,416,013	60,600	3,650	5,480,263	61,541	4 40	11.2
Chesterville	764	500	113,020	16,350	400	134,770	2,531	3 30	18.8
Iroquois	1,200	800	313,375	15,000	1,000	329,375	5,992	4 99	18.2
Morrisburg	1,782	1,067	647,900	41,100	24,566	713,566	10,110	5 67	14.2
Winchester	1,003	500	193,350	23,915	3,850	221,115	4,345	4 33	19.7
Total villages	4,749	2,867	1,272,645	96,365	29,816	1,398,826	22,978	4 84	16.4
†STORMONT :									
Cornwall	4,939	64,144	1,043,215	.....	2,950	1,046,165	14,445	2 93	13.8
Finch	3,660	50,944	653,450	2,300	.....	655,750	11,800	3 69	17.2
Onsabruck	4,801	62,240	1,194,189	16,050	1,600	1,211,839	16,266	3 39	13.4
Roxborough	4,075	71,139	757,525	2,850	100	760,475	13,213	3 24	17.4
Total townships	16,875	248,467	3,648,379	21,200	4,650	3,674,229	55,264	3 27	15.0
Cornwall (town)	6,334	740	1,541,050	49,550	23,550	1,614,150	36,239	5 72	22.5
†GLEGARRY :									
Charlottenburg	4,777	83,628	1,124,150	31,880	800	1,156,830	18,452	3 86	16.0
Kenyon	3,705	77,889	767,565	1,850	.....	769,415	9,795	2 34	12.7
Lancaster	3,561	57,147	913,757	2,400	.....	916,157	10,420	2 93	11.4
Lochiel	4,075	71,498	1,060,325	.....	.....	1,000,325	11,025	2 71	11.0
Total townships	16,118	290,142	3,805,797	36,130	800	3,842,727	49,692	3 08	12.9
Alexandria	1,689	496	200,772	6,550	.....	207,322	6,926	4 10	33.4
Lancaster	511	127	76,645	800	.....	77,445	1,467	2 87	18.9
Maxville	703	240	55,360	.....	.....	55,360	1,192	1 70	21.5
Total villages	2,903	863	332,777	7,350	.....	340,127	9,585	3 30	28.2
PRESCOTT :									
Alfred	3,155	43,919	323,350	.....	.....	323,350	6,897	2 19	21.3
Caledonia	1,735	44,847	278,800	450	.....	279,250	5,447	3 14	19.5
Hawkesbury, E	4,816	56,391	445,525	3,585	.....	449,110	9,346	1 94	20.8
Hawkesbury, W	1,262	24,405	224,566	.....	.....	244,566	4,861	3 85	21.6
Longueuil	912	17,283	172,485	.....	.....	172,435	3,491	3 83	20.2
Plantagenet, N	3,407	51,296	396,260	5,050	300	401,610	9,496	2 79	23.6
Plantagenet, S	3,167	49,439	388,765	5,615	.....	394,380	8,096	2 56	20.5
Total townships	18,454	287,580	2,229,701	14,700	300	2,244,701	47,634	2 58	21.2

* Separated from county for municipal purposes.

† United to Dundas for municipal purposes.

POPULATION, ASSESSMENT AND TAXATION. — *Continued.*

Municipalities.	Population.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Personal property.	Taxable income.	Total.	Total.	Per head.	Mills on \$
			\$	\$	\$	\$	\$	\$ c.	
PRESCOTT:—Continued.									
Hawkesbury	2,925	5,400	223,505	10,250	3,600	237,355	6,952	2 38	29 3
Vankleek Hill	1,461	560	389,125	36,150	4,400	429,675	6,336	4 34	14 7
Total towns	4,386	5,960	612,630	46,400	8,000	667,030	13,288	3 03	19 9
L'Original (village)	1,020	3,995	119,875	.....	200	120,075	2,147	2 10	17 9
*RUSSELL:									
Cambridge	2,637	59,717	416,708	.....	.....	416,708	8,669	3 29	20 8
Clarence	4,775	69,641	351,315	4,050	.....	355,365	11,155	2 34	11 4
Cumberland	3,587	74,362	428,593	2,100	.....	430,693	13,081	3 65	10 4
Russell	2,827	47,245	637,116	6,000	.....	643,116	10,001	3 54	15 6
Total townships	13,826	250,965	1,833,732	12,150	.....	1,845,882	42,906	3 10	23 2
Casselman	380	1,200	36,327	.....	.....	36,327	1,190	3 13	32 8
Rockland	1,795	500	67,935	300	.....	68,235	3,488	1 94	51 1
Total villages	2,175	1,700	104,262	300	.....	104,562	4,678	2 15	44 7
CARLETON:									
Fitzroy	2,589	59,832	757,809	.....	.....	757,809	10,103	3 90	13 3
Gloucester	6,050	85,854	1,412,289	1,500	.....	1,413,789	20,114	3 32	14 2
Goulbourn	2,496	65,034	839,800	.....	.....	839,800	9,592	3 84	11 4
Gower, N	1,996	33,154	894,715	4,875	.....	899,590	7,786	3 90	8 7
Huntley	2,207	61,258	448,355	1,000	.....	449,355	6,834	3 10	15 2
March	1,123	28,375	366,510	.....	.....	366,510	3,283	2 92	9 0
Marlborough	1,537	57,139	454,682	.....	.....	454,682	4,711	3 07	10 4
Nepean	4,633	57,928	2,186,907	3,100	.....	2,190,007	17,597	3 80	8 0
Osgoode	4,684	91,320	1,515,375	7,350	.....	1,522,725	16,102	3 44	10 6
Torbolton	907	25,569	146,885	.....	.....	146,885	2,881	3 18	19 6
Total townships	28,222	565,463	9,023,327	17,825	.....	9,041,152	99,003	3 51	11 0
Hintonburg	2,158	459	384,159	700	.....	384,859	7,296	3 38	19 0
Ottawa East	950	292	192,347	1,500	.....	193,847	3,009	3 17	15 5
Richmond	394	1,454	54,895	3,570	.....	58,465	1,468	3 73	25 1
Total villages	3,502	2,205	631,401	5,770	.....	637,171	11,773	3 36	18 5
RENFREW:									
Admaston	1,921	69,688	746,840	1,500	.....	748,340	5,380	2 80	7 2
Alcona S	875	28,910	44,600	.....	.....	44,600	990	1 13	22 2
Alice and Fraser	1,849	57,438	118,227	.....	.....	118,227	3,215	1 74	27 2
Bagot and Blithfield ..	1,407	56,795	83,752	.....	.....	83,752	3,373	2 40	40 3
Bramley	1,832	49,879	164,073	3,000	2,300	169,373	4,527	2 47	26 7
Brougham	548	20,343	31,970	.....	.....	31,970	896	1 64	28 0
Brudenell & Lyndoch ..	1,292	47,668	74,165	2,400	.....	76,565	2,403	1 86	31 4
Grattan	1,856	59,318	214,341	.....	.....	214,341	3,149	1 70	14 7
Griffith & Matawatch'n ..	725	23,450	20,555	300	.....	20,855	1,253	1 73	60 1
Hagarty, Jones, etc	2,680	74,055	70,070	.....	.....	70,070	72,800	1 04	40 0
Head, Clara & Maria ..	470	15,232	38,555	.....	.....	38,555	1,149	2 44	29 8
Horton	1,527	38,077	482,714	.....	.....	482,714	3,972	2 60	8 2
McNab	3,301	62,867	468,945	6,260	.....	475,205	8,214	2 49	17 3
Pembroke	661	8,778	258,976	.....	.....	258,976	1,621	2 45	6 3
Petewawa	952	24,896	41,293	.....	.....	41,293	1,632	1 71	39 5
Radcliffe & Raglan	1,019	37,600	80,230	.....	.....	80,230	2,191	2 15	27 3
Rolph, Buchanan and Wylie ..	1,008	38,134	55,462	.....	.....	55,462	2,012	2 00	36 3
Ross	2,739	52,046	636,050	1,800	.....	637,850	5,585	2 04	8 8
Sebastopol	691	29,693	53,568	.....	.....	53,568	889	1 29	16 6

* United to Prescott for municipal purposes.

† From return for 1897. No return for 1898.

POPULATION, ASSESSMENT AND TAXATION.—Continued.

Municipalities.	Popula- tion.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Per- sonal prop- erty.	Taxable income.	Total.	Total.	Per head.	Mills on \$.
			\$	%	\$	\$	\$	\$ c.	
RENFREW.—Continued.									
Stafford	978	21,321	75,650			75,650	2,311	2 36	30.5
Westmeath	3,262	70,182	288,255	3,535		291,790	8,918	2 73	30.6
Wilberforce & Algona N	2,206	68,337	139,010	325		139,335	3,928	1 78	28.2
Total townships	33,799	954,709	4,187,301	19,120	2,300	4,208,721	70,408	2 08	16.7
Arnprior	3,706	923	642,724	50,425	5,400	698,549	15,933	4 30	22.8
Pembroke	5,025	645	998,700	122,475	20,950	1,142,125	26,353	5 24	23.1
Renfrew	3,103	2,177	979,790	71,400	3,400	1,054,590	20,109	6 48	19.1
Total towns	11,834	3,745	2,621,214	244,300	29,750	2,895,264	62,395	5 27	21.6
Eganville (village)....	972	485	236,540	43,650		280,190	3,193	3 28	11.4
LANARK:									
Bathurst	2,710	63,130	665,210	23,535		688,745	6,744	2 49	9.8
Beckwith	1,672	56,890	490,160	16,155		506,315	5,916	3 54	11.7
Burgess N	901	33,703	178,895	9,610		188,505	2,208	2 45	11.7
Dalhousie and Sher- brooke N	1,858	74,894	251,116	2,800	200	254,116	4,347	2 34	17.1
Darling	733	44,307	60,334			60,334	1,550	2 11	25.7
Drummond	1,975	57,787	690,561	22,435		712,996	7,039	3 56	9.9
Elmsley N	1,040	28,146	329,795	15,760		345,555	3,186	3 06	9.2
Lanark	1,740	57,675	432,670	24,495		457,165	4,735	2 72	10.4
Lavant	520	43,947	53,242	2,700		55,942	1,804	3 47	32.2
Montague	1,913	61,807	575,562	9,425		584,987	6,947	3 63	11.9
Pakenham	1,891	56,231	617,492	10,225		627,717	6,331	3 33	10.0
Ramsay	2,158	61,306	644,260	36,975		681,235	8,834	4 09	13.0
Sherbrooke S	905	36,838	90,596	2,550		93,146	1,536	1 70	16.5
Total townships	20,016	676,661	5,079,893	176,665	200	5,256,758	61,147	3 05	11.6
Almonte	3,108	700	706,230	98,450	10,950	815,630	16,980	5 46	20.8
Carleton Place	4,197	550	802,235	62,350	10,100	874,685	23,002	5 48	26.3
*Perth	3,683	1,000	1,111,785	112,900	36,500	1,261,185	21,908	5 95	17.4
Smith's Falls	4,423	900	1,019,570	52,850	8,300	1,080,720	23,510	5 32	21.8
Total towns	15,411	3,150	3,639,820	326,550	65,850	4,032,220	85,395	5 54	21.2
Lanark (village)	857	2,684	155,320	16,870	1,350	173,540	4,110	4 80	23.7
VICTORIA:									
Bexley	867	28,358	123,016	600		123,616	3,489	4 02	28.2
Carden	747	43,233	62,502			62,502	1,972	2 64	31.6
Dalton	476	27,918	32,815			32,815	1,152	2 42	35.1
Eldon	2,972	62,025	757,575	3,775		761,350	10,629	3 58	14.0
Emily	1,986	59,024	342,548			342,548	9,952	5 01	10.6
Fenelon	2,234	51,563	712,020			712,020	8,453	3 78	11.9
Laxton, Digby and Longford	777	71,849	75,579			75,579	2,546	3 28	33.7
Mariposa	3,907	74,881	2,589,880		700	2,590,580	19,054	1 88	7.4
Ops	2,303	56,324	1,561,500		300	1,561,800	13,499	5 86	8.6
Somerville	2,081	63,364	203,450	1,940		205,390	5,683	2 73	27.7
Verulam	1,872	55,685	525,080	400		525,480	7,684	4 10	14.6
Total townships	20,222	594,224	7,585,965	6,715	1,000	7,593,680	84,113	4 16	11.1
Lindsay (town)	7,152	1,550	1,748,725	144,800	32,050	1,925,575	47,046	6 58	24.4
Bobcaygeon	837	439	135,711	11,650		147,361	2,739	3 27	18.6
Fenelon Falls	1,320	508	162,074	14,450		176,524	4,913	3 72	27.8

* Separated from county for municipal purposes.

POPULATION, ASSESSMENT AND TAXATION.—Continued.

Municipalities.	Popula- tion.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Per- sonal prop- erty.	Taxable income.	Total.	Total.	Per head.	Mills on \$
			\$	\$	\$	\$	\$	c.	
VICTORIA.—Continued.									
Omeme	559	415	96,328	3,250	.....	99,578	1,979	3 54	19.9
Woodville	543	468	79,755	3,250	.....	83,005	986	1 82	11.9
Total villages	3,259	1,830	473,868	32,600	.....	506,468	10,617	3 26	21.0
PETERBOROUGH:									
Asphodel	1,788	37,758	844,430	750	.....	845,180	7,325	4 10	8.7
Belmont and Methuen.	1,940	80,070	193,794	.....	.....	193,794	5,547	2 86	28.6
Burleigh & Anstruther	603	33,674	52,745	.....	.....	52,745	2,374	3 94	45.0
Chandos	754	41,374	55,401	.....	.....	55,401	2,115	2 81	38.2
Douro	2,126	38,651	777,138	.....	.....	777,138	6,274	2 95	8.1
Dummer	1,996	66,900	614,515	.....	800	615,315	5,337	2 67	8.7
Ennismore	655	17,283	360,590	.....	.....	360,590	2,554	3 90	7.1
Galway and Cavendish	1,050	47,178	51,210	.....	.....	51,210	1,464	1 39	28.6
Harvey	1,000	68,070	166,212	.....	.....	166,212	3,095	3 10	18.6
Monaghan, N.	982	13,871	611,450	.....	.....	611,450	4,140	4 22	6.8
Otonabee	3,366	64,684	1,975,514	8,850	500	1,984,864	13,989	4 16	7.0
Smith	2,683	58,292	1,436,945	.....	.....	1,436,945	10,804	4 03	7.5
Total townships	18,943	567,805	7,139,944	9,600	1,300	7,150,844	65,018	3 43	9.1
*Peterborough (town).	10,854	1,282	3,947,000	228,150	128,700	4,303,850	74,602	6 87	17.3
Ashburnham	1,760	922	415,119	14,900	1,700	431,719	6,588	3 74	15.3
Havelock	956	457	127,880	2,350	.....	130,230	2,579	2 70	19.8
Lakefield	1,180	490	273,225	26,200	2,600	302,025	4,302	3 65	14.2
Norwood	1,109	415	211,460	18,725	750	230,935	4,813	4 34	20.8
Total villages	5,005	2,284	1,027,684	62,175	5,050	1,094,909	18,282	3 65	16.7
HALIBURTON:									
Anson and Hindon ...	288	13,722	33,540	1,475	.....	35,015	820	2 85	23.4
Cardiff	650	25,559	31,933	.....	.....	31,933	1,789	2 75	52.9
Dysart	990	366,377	125,400	3,900	.....	129,300	3,852	3 89	29.8
Glamorgan	578	22,293	25,361	.....	.....	25,361	1,339	2 32	52.8
Lutterworth	506	22,146	36,051	.....	.....	36,051	1,264	2 53	35.1
Minden	1,207	35,523	84,100	2,100	.....	86,200	3,255	2 70	37.8
Monmouth	537	21,340	25,374	.....	.....	25,374	1,703	3 17	67.1
+Sherbourne, etc.	121	10,835	18,066	.....	.....	18,066	522	4 31	28.9
Snowdon	728	35,854	70,557	1,575	.....	72,132	2,777	3 81	38.5
Stanhope	414	15,436	24,828	675	.....	25,503	1,317	3 18	51.6
Total townships	6,013	569,085	475,210	9,725	.....	484,935	18,638	3 10	38.4
HASTINGS:									
Bangor, Wicklow and McClure	865	30,209	23,702	.....	.....	23,702	1,718	1 99	72.5
Carlow	578	19,495	48,475	.....	.....	48,475	1,754	3 03	36.2
Dungannon	757	33,430	48,091	.....	.....	48,091	2,146	2 83	44.6
Elzevir & Grimsthorpe.	1,296	61,813	102,000	.....	.....	102,000	3,293	2 54	32.3
Faraday	949	46,949	65,666	1,700	.....	67,366	3,040	3 20	45.1
Hungerford	3,246	93,614	727,353	800	.....	728,153	11,445	3 53	15.7
Huntingdon	2,620	54,818	431,169	.....	.....	431,169	7,095	2 71	16.5
Limerick	446	44,256	53,678	.....	.....	53,638	1,154	2 59	21.7
Madoc	2,673	67,254	491,567	.....	.....	491,567	11,306	4 23	23.0
Marmora and Lake ...	2,134	108,188	297,395	3,150	.....	300,545	7,291	3 42	24.3
Mayo	648	19,149	27,775	.....	.....	27,775	1,622	2 50	58.4
Monteagle & Herschel.	1,785	65,463	72,549	.....	.....	72,549	3,266	1 83	45.0
Rawdon	3,400	65,830	1,185,235	.....	.....	1,185,235	12,800	3 76	10.8
Sidney	4,172	69,610	2,058,495	.....	8,200	2,066,695	17,221	4 13	8.3
Thurlow	4,687	53,442	2,044,500	.....	.....	2,044,500	17,151	3 66	8.4
Tudor and Cashel	920	61,055	67,201	.....	.....	67,201	2,430	2 64	36.2

*Separated from county for municipal purposes.

+Separated from Stanhope.

POPULATION, ASSESSMENT AND TAXATION.—Continued.

Municipalities.	Population.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Personal property.	Taxable income.	Total.	Total.	Per head.	Mills on
			\$	\$	\$	\$	\$	\$ c	
HASTINGS.—Continued.									
Tyendinaga	3,703	76,523	1,417,029	.....	2,800	1,419,829	14,805	4 00	10 4
Wollaston	721	50,072	61,425	.....	.....	61,425	2,071	2 87	33.7
Total townships	35,600	1,023,670	9,223,265	5,650	11,000	9,239,915	121,608	3 42	13.2
Deseronto	3,246	533	612,625	22,650	7,550	642,825	17,356	5 36	27.0
*Trenton	3,833	1,800	1,101,642	33,250	5,800	1,140,692	24,466	6 38	21.4
Total towns	7,079	2,333	1,714,267	55,900	13,350	1,783,517	41,822	5 91	23.4
Madoc	1,195	423	267,550	29,792	11,450	308,792	5,496	4 60	17.8
Stirling	828	720	165,949	3,250	200	169,399	3,502	4 23	20.7
Tweed	1,004	389	193,390	29,350	700	223,440	3,854	3 84	17.2
Total villages	3,027	1,532	626,889	62,392	12,350	701,631	12,852	4 25	18.3
MUSKOKA:									
Brunel	725	41,097	70,625	.....	.....	70,625	2,119	2 92	30.0
Cardwell	464	27,943	62,608	3,650	.....	66,258	1,367	2 95	20.6
Chaffey	1,040	43,522	131,139	.....	.....	131,139	3,067	2 95	23.4
Draper	988	38,015	8,560	4,220	.....	92,789	2,486	2 52	26.8
McLean and Ridout	720	40,114	98,524	2,245	.....	100,769	1,344	1 87	13.3
Macaulav	639	34,806	96,979	.....	.....	96,979	2,237	3 50	23.1
Medora and Wood	907	58,331	207,191	.....	.....	207,191	3,551	3 92	17.1
Monck	868	28,062	173,332	2,000	.....	175,332	2,414	2 78	13.8
Morrison	889	21,043	78,271	1,450	.....	79,721	1,920	2 16	24.1
Muskoka	748	32,090	94,090	.....	.....	94,090	2,115	2 83	22.5
Oakley	396	21,884	38,155	.....	.....	38,155	985	2 49	25.8
Ryde	554	23,283	45,529	250	.....	45,779	1,284	2 03	24.6
Stephenson	1,164	43,310	122,675	13,295	.....	135,970	2,984	2 56	21.9
Stitts	597	43,504	102,098	800	730	103,628	1,883	3 15	18.2
Watt	890	35,003	119,825	1,450	.....	121,275	2,475	2 78	20.4
Total townships	11,589	534,957	1,529,610	29,360	730	1,559,700	32,071	2 77	20.6
Bracebridge	2,173	575	286,035	32,100	5,000	323,135	11,305	5 20	35.0
Gravenhurst	2,161	479	301,520	1,000	2,000	304,520	10,752	4 98	15.3
Total towns	4,334	1,054	587,555	33,100	7,000	627,655	22,057	5 09	35.1
Huntsville	1,941	458	228,949	28,000	1,450	258,399	8,612	4 44	33.3
Port Carling	281	3,719	45,159	2,630	750	48,539	746	2 65	15.4
Total villages	2,222	4,177	274,108	30,630	2,200	306,938	9,358	4 21	30.5
PARRY SOUND:									
Amour	850	38,406	175,323	500	.....	175,823	2,388	2 81	13.6
Carling	343	25,894	33,555	430	.....	33,985	778	2 27	23.0
Chapman	691	34,812	119,741	4,470	.....	124,211	977	1 41	7.9
Christie	365	26,161	64,784	.....	.....	64,784	699	1 92	10.8
Foley	481	30,770	68,889	.....	.....	68,889	972	2 02	14.1
Hagerman	560	18,023	47,835	950	.....	48,785	1,220	2 22	25.0
Hinsworth, N.	632	15,953	60,291	4,550	.....	64,841	1,987	3 14	30.6
Hinsworth, S.	1,511	50,431	200,791	10,200	.....	210,991	3,103	2 01	14.7
Humphrey	639	27,806	112,450	3,200	.....	115,650	1,792	2 80	15.5
Joly	310	20,979	40,809	.....	.....	40,809	816	2 63	20.0
McDougal	484	27,618	65,522	.....	.....	65,522	1,410	2 91	21.5
McKellar	572	28,632	81,560	.....	.....	81,560	1,701	2 97	20.9
McMurrich	766	39,060	123,564	.....	.....	123,564	2,126	2 78	17.2
Macfar	823	35,917	114,473	770	.....	115,243	2,261	2 75	19.6
Nipissing	647	28,840	96,966	1,425	.....	98,391	1,280	1 93	12.7
Perry	1,377	42,787	205,846	6,625	.....	212,471	3,492	2 54	16.4

* Separated from county for municipal purposes.

POPULATION, ASSESSMENT AND TAXATION.—Continued.

Municipalities.	Popu- lation.	No. of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Per- sonal prop- erty.	Taxable income	Total.	Total.	Per head.	Mils on \$.
			\$	\$	\$	\$	\$	\$ c.	
PARRY SOUND:—Con.									
Ryerson	631	41,607	130,746			130,746	1,983	3 14	15 2
Strong	822	39,360	132,280			132,280	1,756	2 14	13 3
Total townships ...	12,524	573,086	1,875,425	33,120		1,908,545	30,711	2 45	16 1
Parry Sound (town) ..	2,008	805	353,890	22,100	1,550	377,540	11,915	5 93	31.6
Burk's Falls	723	619	107,528	15,050	500	123,078	3,199	4.42	26.0
Sundridge	452	457	64,545	6,000		70,545	2,160	4.78	30.6
Total villages	1,175	1,076	172,073	21,050	500	193,623	5,359	4.56	27.7
PIPPISSE:									
Bonfield	1,478	34,434	78,260	850		79,110	3,161	2 14	40 0
Caldwell	746	28,832	144,000			144,000	1,436	1.92	10.0
Calvin	474	27,062	60,695			60,695	1,312	2 77	21.6
Cameron	323	11,174	85,501	10,400	300	96,201	618	1.91	6.4
Dunnott and Ratter ..	715	23,965	49,965			49,965	1,354	1 89	27.1
Feris	767	33,933	60,714	300	75	61,089	1,946	2.54	31.9
McKim	912	17,909	65,408	26,070	750	92,228	3,077	3.37	33.4
Mattawan	245	10,985	26,765			26,765	603	2.46	22.5
Papineau	664	20,933	48,312			48,312	824	1.24	17.1
Springer	825	30,363	47,546	700		48,246	2,832	3.43	58.7
Widdifield	602	49,954	67,375			67,375	1,481	2 46	22.0
Total townships	7,751	289,564	734,541	38,320	1,125	773,986	18,644	2 41	24.1
Mattawa	1,242	500	241,437	47,170	500	289,107	7,200	5.80	2.49
North Bay	2,385	500	432,630	13,000		445,630	10,907	4.57	24.5
Sturgeon Falls	1,017	1,351	108,885	10,225	200	119,310	2,100	2 06	17.6
Sudbury	1,415	2,560	272,345	39,725	5,550	317,620	9,255	6.54	29.1
Total towns	6,059	4,911	1,055,297	110,120	6,250	1,171,667	29,462	4.86	25.1
MANITOULIN:									
Assinack	1,177	37,034	138,811	3,000		141,811	2,410	2.05	17.0
Billings	408	22,741	66,158			66,158	1,376	3.25	20.0
Burpee	228	12,857	21,895			21,895	769	3.37	35.1
Carnarvon	550	25,349	68,177			68,177	1,430	2.60	21.0
Cockburn Island	145	12,039	18,650	8,600		27,250	610	4.21	22.4
Gordon	560	32,702	110,197			110,197	1,932	3.45	17.5
Howland	1,011	39,979	129,691	1,300		130,991	2,387	2.36	18.2
Sanfield	253	11,938	32,465	250		32,715	798	3.15	24.4
Tehkummah	444	16,908	50,000			*50,000	707	1.59	14.1
Total townships	4,776	211,547	636,044	13,150		649,194	12,369	2.59	19.1
Gore Bay	584	1,116	89,625	14,600		104,225	2,754	4 72	26.4
Little Current	511	400	90,345	11,300	350	101,995	2,009	3.93	19.7
Total towns	1,095	1,516	179,970	25,900	350	206,220	4,763	4.35	23.1
ALGOMA:									
Balfour	670	18,930	65,525			65,525	1,930	2.88	29.5
Drury, Denison and Graham	160	39,952	90,161			90,161	1,579	9.87	17.5
Hallam	482	14,508	91,178	7,050		98,228	1,766	3 66	18.0
Hilton	380	27,025	43,295			43,295	909	2.59	21.0
Jocelyn	436	22,036	49,348			49,348	1,203	2.76	2.44
John-on, Tarbutt and Tarbutt Additional ..	832	36,196	112,482	2,150	200	114,832	1,563	1.88	13.6
Laird	374	14,663	69,909			69,909	856	2.29	12.2

* This assessment stands for three years as per by-law.

POPULATION, ASSESSMENT AND TAXATION.—*Concluded.*

Municipalities.	Popula- tion.	No of acres assessed	Assessed values.				Taxes imposed for all purposes.		
			Real pro- perty.	Per- sonal property.	Tax- able in- come.	Total.	Total.	Per head.	Mills on \$
			\$	\$	\$	\$	\$	\$ c.	
ALGOMA.—Continued.									
Macdonald and Mere- dith	471	14,457	51,267	.....	.....	51,267	948	2.01	18.5
Nairn, Lorne and Hyman	400	15,997	49,324	7,642	.....	56,966	691	1.73	12.1
Plummer Additional ..	508	15,295	86,044	.....	.....	86,044	1,500	2.95	17.4
Prince	117	20,797	36,962	1,500	.....	38,462	674	5.76	17.5
Rayside	670	18,377	37,483	.....	.....	37,483	1,716	2.56	45.8
St Joseph	907	27,995	99,465	2,100	.....	101,565	2,371	2.61	23.3
Salter, May and 116 ..	*703	35,658	113,152	17,075	.....	130,227	3,396	4.83	26.1
Sault Ste. Marie	784	46,595	271,772	.....	.....	271,772	5,315	6.78	19.6
Thessalon	580	17,484	53,343	300	.....	53,643	1,538	2.65	28.7
Total townships	8,474	386,364	1,320,710	37,817	200	1,358,727	27,955	3.30	20.6
Sault Ste. Marie	3,333	2,100	†1,765,210	38,150	22,710	†1,826,070	†38,609	11.58	21.1
Thessalon	904	728	128,255	18,000	.....	146,255	3,724	4.12	25.5
Total towns	4,237	2,828	1,893,465	56,150	22,710	1,972,325	42,333	9.99	21.5
THUNDER BAY :									
Neebing	145	119,012	176,300	.....	.....	176,300	3,139	21.65	17.8
Oliver	†376	32,528	101,689	750	.....	102,439	1,091	2.90	10.7
Shuniah	142	94,857	162,453	.....	.....	162,453	2,845	20.04	17.5
Total townships	663	246,397	440,442	750	.....	441,192	7,075	10.67	16.0
Fort William	3,316	7,000	980,325	43,075	21,800	1,045,200	26,449	7.98	25.3
Port Arthur	2,332	12,500	1,237,190	57,725	13,725	1,308,640	31,973	13.71	24.4
Total towns	5,648	19,500	2,217,515	100,800	35,525	2,353,840	58,422	10.34	24.8
RAINY RIVER :									
Alberton	140	17,855	43,438	.....	.....	43,438	350	2.50	8.1
Keewatin	954	2,569	250,600	8,070	.....	258,650	4,588	4.81	17.7
McIrvine	230	3,169	78,654	8,940	.....	87,594	1,284	5.58	14.7
Total townships	1,324	23,584	572,692	16,990	.....	589,682	6,222	4.70	16.0
at Portage (town) ...	5,040	5,760	1,297,500	130,085	4,000	1,431,585	42,074	8.35	29.4

* Taken from 1897 return.

† Increase caused by assessing the Lake Superior Power Co. and allied companies for \$750,000 for school purposes only, and striking a rate for schools for 1898 and also 1897.

‡ This is population for 1897, as it was not filled in on assessment roll for 1898.

\$ No returns. The figures given are for previous year.

|| Organized in 1898, a portion being taken from the municipality of Alberton.

ASSESSMENT AND TAXATION.

TABLE II. Detailed statement of the cities of Ontario, giving statistics of population, assessment and taxation for the three years 1896, 1897 and 1898.

Cities.		Popu- lation.	No. of acres assess- ed.	Assessed values.				Taxes imposed for all purposes.		
				Real property.	Personal property.	Taxable income.	Total.	Total.	Per head.	Mls on \$
				\$	\$	\$	\$	\$	\$ c.	
Windsor: (Essex Co.)	{ 1898	11,334	2,020	5,122,890	154,000	56,050	5,332,440	155,682	13 74	29.2
	{ 1897	11,915	2,020	5,208,685	171,050	57,000	5,436,735	154,938	13 00	28.5
	{ 1896	11,392	2,020	5,313,450	170,110	62,250	5,545,800	160,675	14 10	29.3
Chatham: (Kent Co.)	{ 1898	8,923	1,650	3,323,709	140,925	73,525	3,538,159	84,556	9 48	2.39
	{ 1897	8,788	1,650	3,328,560	149,600	74,150	3,552,310	74,923	8 53	21.1
	{ 1896	8,833	1,650	3,328,013	159,650	76,000	3,563,693	77,533	8 78	21.8
St. Thomas: (Elgin Co.)	{ 1898	11,156	1,700	3,973,819	243,750	213,400	4,430,969	104,337	9 35	23.5
	{ 1897	11,021	1,700	3,919,930	239,100	240,250	4,399,330	95,504	8 67	21.7
	{ 1896	10,682	1,600	3,771,710	238,150	229,300	4,239,160	87,968	8 24	20.8
London: (Middlesex Co.)	{ 1898	38,575	4,085	14,221,354	1,614,550	806,280	16,642,184	381,082	9 88	22.9
	{ 1897	36,224	4,085	13,552,648	1,483,600	800,980	15,837,228	362,435	10 01	22.9
	{ 1896	34,855	4,089	13,188,455	1,460,300	749,225	15,397,980	353,001	10 13	22.9
Brantford: (Brant Co.)	{ 1898	18,009	2,541	5,767,083	588,485	102,435	6,458,003	132,958	7 38	20.6
	{ 1897	16,234	2,541	5,722,543	616,325	113,485	6,452,353	128,244	7 90	19.9
	{ 1896	16,539	2,541	5,660,888	620,575	117,825	6,399,288	125,743	7 60	19.6
Stratford: (Perth Co.)	{ 1898	10,369	2,835	3,754,405	126,950	85,440	3,966,795	87,324	8 42	22.0
	{ 1897	10,531	2,835	3,800,960	114,400	76,900	3,992,260	88,979	8 45	22.3
	{ 1896	10,501	2,835	3,808,935	112,700	82,050	4,003,685	87,394	8 32	21.8
Guelph: (Wellington Co.)	{ 1898	10,802	3,210	3,418,035	264,130	83,440	3,765,605	96,825	8 96	25.7
	{ 1897	10,741	3,210	3,409,995	265,370	97,450	3,772,815	97,122	9 04	25.7
	{ 1896	10,684	3,210	3,373,495	260,020	94,450	3,727,965	96,497	9 03	25.9
St. Catharines: (Lincoln Co.)	{ 1898	10,274	3,000	3,709,975	677,100	45,950	4,433,025	123,304	12 00	27.8
	{ 1897	10,144	3,000	3,641,485	544,750	51,600	4,237,835	119,174	11 75	28.1
	{ 1896	9,894	3,000	3,637,215	541,850	53,750	4,232,815	104,267	10 54	24.6
Hamilton: (Wentworth Co.)	{ 1898	51,011	3,990	22,186,110	2,606,378	1,452,732	26,245,220	541,347	10 61	20.6
	{ 1897	50,035	2,700	21,971,030	2,681,580	763,630	25,416,240	526,859	10 52	20.7
	{ 1896	49,427	2,700	22,258,750	2,667,190	763,830	25,691,770	530,676	10 74	20.7
Toronto: (York Co.)	{ 1898	186,517	9,638	114,531,592	7,795,623	4,522,455	126,849,670	2,639,932	14 15	20.8
	{ 1897	183,172	9,638	117,652,422	8,468,328	4,176,707	130,296,457	2,802,660	15 30	21.5
	{ 1896	178,185	9,638	127,939,439	8,880,666	4,680,331	141,000,436	2,952,953	16 57	20.9
Kingston: (Frontenac Co.)	{ 1898	18,350	2,300	6,528,640	822,550	261,325	7,612,515	149,683	8 16	19.7
	{ 1897	18,009	2,300	6,519,580	816,250	257,900	7,593,734	140,743	7 82	18.5
	{ 1896	18,040	2,300	6,506,745	854,100	260,050	7,620,895	140,189	7 77	18.4
Ottawa: (Carleton Co.)	{ 1898	55,386	3,365	21,218,990	1,814,350	407,325	22,940,665	503,988	9 10	22.0
	{ 1897	53,727	3,365	20,282,585	1,379,450	417,700	22,079,735	482,061	8 97	21.8
	{ 1896	51,540	3,365	19,487,170	1,284,800	349,750	21,121,720	467,756	9 08	22.1
Belleville: (Hastings Co.)	{ 1898	10,183	1,700	3,578,876	198,450	84,800	3,862,126	93,771	9 21	24.3
	{ 1897	10,399	1,700	3,611,268	195,700	92,650	3,899,618	87,447	8 41	22.4
	{ 1896	10,359	1,600	3,667,246	213,550	99,200	3,979,996	83,257	8 04	20.9

ASSESSMENT AND TAXATION.

TABLE III. Summary statement by counties (being the total of townships, cities, towns and villages within limits of county) of items from assessment and collection rolls as given in Table I, for the three years 1896-8.

Counties.	Popula- tion.	No. of acres assessed.	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Personal property.	Taxable income.	Total.	Total.	Per head.	Mills on \$.
ESSEX :			\$	\$	\$	\$	\$ c.		
1898	55,445	437,253	19,558,944	1,156,494	124,586	20,840,024	432,611	7 80	20.8
1897	55,069	438,056	19,584,546	1,175,753	128,850	20,889,149	417,110	7 57	20.0
1896	53,092	437,095	19,709,492	1,161,638	138,917	21,010,017	416,472	7 84	19.8
KENT :									
1898	54,566	574,655	23,200,291	351,860	96,175	23,648,326	373,227	6 84	15.8
1897	52,971	573,278	23,241,521	358,395	90,040	23,729,956	363,818	6 87	15.3
1896	51,835	571,066	23,189,546	358,255	96,980	23,644,781	352,954	6 81	14.9
ELGIN :									
1898	40,556	439,898	17,415,504	497,775	243,930	18,067,209	275,307	6 79	15.2
1897	40,630	442,482	17,370,231	412,045	271,960	18,054,236	266,089	6 54	14.7
1896	40,323	442,174	17,352,193	425,670	256,345	18,034,209	246,345	6 11	13.7
NORFOLK :									
1898	28,586	400,616	9,962,212	147,065	48,239	10,157,516	122,924	4 30	12.1
1897	28,231	401,815	9,969,686	147,775	49,969	10,167,430	114,786	4 07	11.3
1896	28,320	400,720	9,990,792	169,084	51,280	10,201,156	115,007	4 06	11.3
HALDIMAND :									
1898	21,227	283,019	8,035,914	132,975	11,400	8,150,289	86,578	4 03	10.6
1897	21,263	283,611	8,008,344	133,900	14,050	8,156,294	83,632	3 93	10.3
1896	20,794	283,141	8,021,592	151,165	16,700	8,189,457	78,906	3 79	9.6
WELLAND :									
1898	29,963	231,603	11,297,019	469,495	55,300	11,821,814	166,642	5 56	14.1
1897	30,305	231,753	11,148,364	426,400	63,300	11,635,064	153,808	5 24	13.6
1896	29,914	232,880	11,150,927	465,295	60,425	11,676,647	163,150	5 45	14.6
LAMBTON :									
1898	53,438	671,900	18,815,437	325,875	189,208	19,330,520	317,971	5 93	16.4
1897	53,865	669,889	18,819,144	317,890	200,658	19,337,692	322,340	5 98	16.7
1896	53,219	670,699	18,796,770	329,730	201,964	19,328,464	313,876	5 90	16.2
HERON :									
1898	61,144	805,872	29,791,892	402,718	65,050	30,259,660	251,824	4 17	8.4
1897	61,546	808,223	29,798,310	393,290	71,420	30,269,020	265,963	4 32	8.8
1896	61,039	806,715	29,826,397	403,685	74,170	30,304,252	252,695	4 14	8.3
BRUCE :									
1898	55,831	877,220	20,625,274	422,805	57,450	21,105,529	220,342	3 95	10.4
1897	56,330	879,786	20,727,059	435,035	51,050	21,213,144	211,045	3 75	9.9
1896	57,690	878,944	20,902,238	551,035	51,975	21,505,248	206,646	3 58	9.6
GREY :									
1898	64,325	1,071,642	20,144,238	294,700	63,700	20,502,638	247,818	3 95	12.1
1897	65,051	1,073,868	19,856,727	290,300	60,175	20,207,202	272,033	4 18	13.5
1896	65,979	1,070,114	19,908,799	299,725	47,796	20,256,320	252,396	3 83	12.5
SIMCOE :									
1898	77,783	976,824	19,813,078	355,530	102,380	20,270,988	320,776	4 12	15.8
1897	78,210	979,978	19,804,040	332,970	93,250	20,230,260	332,486	4 24	16.4
1896	77,143	979,582	19,962,881	353,235	93,250	20,411,366	320,805	4 16	15.7
MIDDLESEX :									
1898	91,480	766,614	39,403,322	1,776,025	827,330	42,006,677	655,846	7 17	15.6
1897	90,862	765,433	33,918,376	1,649,285	928,380	41,396,041	637,808	7 02	15.4
1896	89,464	767,030	38,814,119	1,610,666	778,185	41,202,970	630,070	7 03	15.3
OXFORD :									
1898	47,400	479,975	24,031,731	364,371	84,200	24,480,302	262,680	5 54	10.7
1897	46,391	479,579	24,017,035	367,900	113,500	24,498,435	257,608	5 55	10.5
1896	46,463	479,851	24,032,160	346,750	119,325	24,498,235	254,262	5 47	10.4
BRANT :									
1898	35,066	218,938	15,980,710	861,639	130,985	16,973,334	215,048	6 13	12.7
1897	33,364	219,404	15,963,031	888,901	139,885	16,991,817	207,025	6 21	12.2
1896	33,998	219,262	15,945,343	913,729	148,045	17,007,117	204,223	6 01	12.0
PERTH :									
1898	48,733	527,133	25,738,078	367,605	125,450	26,231,133	290,341	5 96	11.1
1897	48,219	526,960	24,770,446	363,750	117,390	25,251,586	284,281	5 90	11.3
1896	48,965	527,647	24,730,958	397,300	123,150	25,251,408	280,715	5 73	11.1
WELLINGTON :									
1898	56,018	638,171	23,989,262	649,945	120,490	24,759,697	281,245	5 02	11.4
1897	56,098	638,104	22,575,791	656,370	134,100	23,366,261	287,102	5 12	12.3
1896	56,353	638,391	22,569,520	656,820	133,040	23,359,380	288,045	5 11	12.3

ASSESSMENT AND TAXATION.—Continued.

Counties.	Population.	No. of acres assessed.	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Personal property.	Taxable income.	Total.	Total.	Per head.	Mills on \$
WATERLOO:			\$	\$	\$	\$	\$	\$ c.	
1898	52,473	317,450	21,203,662	789,765	135,669	22,128,096	258,793	4 93	11.7
1897	51,017	315,925	21,355,351	774,450	152,149	22,281,950	242,434	4 75	10.9
1896	50,219	317,134	21,499,684	707,105	149,989	22,356,778	221,494	4 41	9.9
DUFFERIN:									
1898	20,810	358,485	6,794,610	57,675	16,000	6,868,285	88,693	4 26	12.9
1897	21,734	357,802	6,864,392	56,925	21,000	6,942,317	94,862	4 36	13.6
1896	21,371	358,618	6,918,955	50,450	17,500	6,986,905	87,627	4 10	12.5
LINCOLN:									
1898	30,315	196,733	11,743,187	910,118	62,461	12,715,766	223,720	7 38	17.6
1897	29,976	196,846	11,637,431	717,753	66,045	12,471,229	220,619	7 36	17.7
1896	29,716	196,545	11,565,076	691,648	70,128	12,329,852	201,079	6 77	16.3
WENTWORTH:									
1898	77,251	277,528	35,242,483	2,790,353	1,496,132	39,528,968	612,817	8 32	16.3
1897	76,823	276,014	35,120,528	2,824,855	807,966	38,753,349	619,949	8 07	16.0
1896	76,213	275,628	35,428,275	2,816,440	805,996	39,050,711	613,283	8 05	15.7
HALTON:									
1898	19,620	228,380	9,221,378	142,885	21,380	9,385,643	80,084	4 03	8.5
1897	19,721	227,918	9,212,653	159,534	19,115	9,391,302	76,212	3 86	8.1
1896	20,034	228,433	9,224,898	160,615	28,750	9,414,263	73,667	3 68	7.8
PEEL:									
1898	20,738	290,415	10,516,615	90,250	24,000	10,630,865	97,001	4 68	9.1
1897	21,240	290,750	10,510,407	90,105	21,450	10,621,962	93,929	4 42	8.8
1896	21,538	290,219	10,532,655	97,975	25,700	10,656,330	89,241	4 14	8.4
YORK:									
1898	244,676	556,982	142,589,094	8,014,918	4,557,360	155,161,372	2,972,286	12 15	19.2
1897	240,363	556,285	145,737,251	8,680,278	4,203,507	158,621,036	3,149,271	13 10	19.9
1896	235,857	556,900	156,567,115	8,599,816	4,716,731	169,883,662	3,307,804	14 02	19.5
ONTARIO:									
1898	40,817	508,645	17,559,731	311,790	55,060	17,926,581	176,814	4 33	9.9
1897	41,159	506,522	17,648,656	323,490	56,735	18,028,881	179,987	4 37	10.0
1896	41,097	506,808	17,809,337	392,795	58,685	18,260,817	186,182	4 53	10.2
DURHAM:									
1898	28,132	377,724	12,242,531	273,805	85,430	12,601,766	133,365	4 74	10.6
1897	28,801	377,520	12,262,715	285,155	89,685	12,637,555	132,847	4 61	10.5
1896	29,210	377,766	12,635,994	270,434	90,745	13,047,173	132,928	4 55	10.2
NORTHUMBERLAND:									
1898	34,104	442,533	12,991,633	215,100	51,170	13,257,903	149,023	4 37	11.2
1897	34,014	442,375	13,100,554	215,975	56,820	13,373,349	150,983	4 44	11.3
1896	33,800	443,714	13,120,003	221,955	61,020	13,402,978	144,077	4 26	10.7
PRINCE EDWARD:									
1898	16,960	234,583	6,656,659	114,790	23,900	6,795,349	70,663	4 17	10.4
1897	17,035	233,876	6,634,094	109,045	29,570	6,772,709	68,329	4 00	10.1
1896	17,644	231,076	6,631,579	122,655	28,250	6,782,484	70,366	3 99	10.4
LENNOX & AD'GTON:									
1898	22,113	443,270	7,551,900	92,185	34,460	7,678,545	105,069	4 75	13.7
1897	22,112	446,362	7,561,733	98,820	44,160	7,704,713	105,142	4 75	13.6
1896	21,697	441,216	7,614,096	102,640	39,785	7,756,521	101,511	4 70	13.1
FRONTENAC:									
1898	40,603	690,226	11,332,247	859,506	274,925	12,466,678	237,739	5 86	19.1
1897	40,058	692,625	11,294,137	852,362	271,275	12,417,774	230,120	5 74	18.5
1896	40,376	675,754	11,302,224	891,349	274,625	12,468,198	226,599	5 61	18.2
LEEDS:									
1898	34,773	474,174	11,543,203	285,935	63,010	11,892,153	194,966	5 61	16.4
1897	35,458	472,767	11,466,952	313,831	69,835	11,880,618	193,456	5 46	16.3
1896	35,671	474,873	11,441,970	302,385	83,760	11,828,115	180,700	5 07	15.3
GRENVILLE:									
1898	19,316	273,727	6,229,310	106,600	37,175	6,373,085	71,230	3 69	11.2
1897	19,320	273,808	5,896,927	104,275	33,337	6,036,539	75,556	3 91	12.5
1896	19,519	271,634	6,015,822	105,900	35,625	6,157,347	71,960	3 69	11.7
DUNDAS:									
1898	18,733	239,668	6,683,658	156,965	33,466	6,879,089	84,519	4 51	12.3
1897	18,329	240,555	6,748,247	161,741	39,150	6,949,138	89,462	4 88	12.9
1896	18,296	239,922	7,041,927	113,125	41,650	7,196,702	82,956	4 53	11.5
STORMONT:									
1898	23,209	249,207	5,189,429	70,750	23,200	5,288,379	91,503	3 94	17.3
1897	23,333	248,898	5,152,129	69,850	26,250	5,248,229	84,169	3 61	16.0
1896	23,063	250,875	5,150,225	74,650	30,100	5,254,975	79,875	3 46	15.2

ASSESSMENT AND TAXATION.—*Concluded.*

Counties.	Popula- tion.	No. of acres assessed.	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Personal property.	Taxable income.	Total.	Total.	Per head.	Mills on \$.
GLENGARRY:			\$	\$	\$	\$	\$	\$ c.	
1898	19,021	291,035	4,138,574	43,480	800	4,182,854	59,277	3 12	14.2
1897	19,255	288,682	4,111,129	49,425	300	4,160,854	57,061	2 96	13.7
1896	19,187	285,905	4,112,417	58,940	650	4,172,007	54,431	2 84	13.0
PRESCOTT:									
1898	23,860	297,535	2,962,206	61,106	8,500	3,031,806	63,069	2 64	20.8
1897	23,708	295,774	2,701,470	32,145	6,350	2,739,965	58,750	2 48	21.4
1896	24,088	296,263	2,679,246	34,708	6,500	2,720,454	54,942	2 28	20.2
RUSSELL:									
1898	16,001	252,665	1,937,994	12,450	.....	1,950,444	47,584	2 97	24.4
1897	16,813	252,824	1,935,171	13,325	.....	1,948,496	44,645	2 65	23.9
1896	16,603	252,823	1,965,764	15,010	200	1,980,974	44,233	2 66	22.3
CARLETON:									
1898	87,110	571,033	30,873,718	1,337,945	407,325	32,618,988	314,764	7 06	18.8
1897	84,919	569,502	29,671,667	1,402,320	417,700	31,491,087	285,047	6 89	18.6
1896	82,659	571,339	28,844,104	1,304,905	349,750	30,498,849	266,611	6 85	18.6
RENFREW:									
1898	46,605	958,889	7,045,055	307,070	32,050	7,384,175	135,996	2 92	18.4
1897	46,623	962,433	5,555,944	261,081	34,950	5,851,999	132,484	2 84	22.6
1896	45,928	954,448	4,796,773	289,885	38,050	5,104,768	129,549	2 82	25.4
LANARK:									
1898	36,284	682,495	8,875,033	520,085	67,407	9,462,518	150,652	4 15	15.9
1897	35,962	685,276	8,582,766	488,990	64,100	9,135,856	140,037	3 89	15.3
1896	36,129	678,265	8,485,754	508,660	65,630	9,060,044	135,589	3 75	15.0
VICTORIA:									
1898	30,633	597,604	9,808,558	184,115	33,050	10,025,723	141,776	4 63	14.1
1897	30,433	592,080	9,833,996	181,025	33,625	10,048,646	140,303	4 61	11.0
1896	30,099	593,488	9,840,308	183,065	40,235	10,066,668	139,659	4 64	13.9
PETERBOROUGH:									
1898	34,802	571,371	12,114,628	299,925	135,050	12,549,603	157,902	4 54	12.6
1897	34,897	568,404	12,145,144	293,050	133,800	12,571,994	158,551	4 54	12.6
1896	34,604	565,181	12,214,202	304,275	140,225	12,658,702	158,980	4 67	12.6
HALIBURTON:									
1898	6,013	569,085	475,210	9,725	.....	484,935	18,638	3 10	33.4
1897	6,159	566,372	479,074	8,870	300	488,244	19,632	3 19	40.2
1896	6,216	564,826	475,015	9,075	500	484,590	18,964	3 05	39.1
HASTINGS:									
1898	55,889	1,029,235	15,143,297	322,392	121,507	15,587,189	270,053	4 83	17.3
1897	55,676	1,016,833	15,198,444	331,500	119,335	15,649,279	266,829	4 79	17.1
1896	55,225	1,009,492	15,415,856	328,545	118,925	15,863,326	260,616	4 72	16.4
MUSKOKA:									
1898	18,145	540,188	2,391,273	93,090	9,930	2,494,293	63,486	3 50	25.5
1897	17,934	539,433	2,344,543	88,345	7,550	2,440,438	59,934	3 34	24.6
1896	17,432	530,578	2,244,711	115,722	7,650	2,368,083	55,584	3 19	23.5
PARRY SOUND:									
1898	15,707	574,967	2,401,888	76,270	2,050	2,479,708	47,985	3 08	19.4
1897	15,629	552,740	2,342,285	81,940	1,550	2,425,775	47,641	3 05	19.6
1896	13,778	520,693	2,280,857	123,220	1,650	2,405,727	45,765	3 16	19.0
NIPISSING:									
1898	13,810	294,475	1,789,838	148,440	7,375	1,945,653	48,106	3 48	24.7
1897	13,760	293,864	1,599,870	176,151	712	1,776,733	44,961	3 27	25.3
1896	12,388	247,623	1,527,017	167,370	3,903	1,698,287	44,945	3 63	26.5
MANITOULIN:									
1898	5,871	213,063	816,014	39,050	350	855,414	17,132	2 92	20.0
1897	5,744	213,870	823,002	37,374	701	861,076	16,603	2 89	19.3
1896	5,924	208,568	810,112	45,045	700	855,857	17,513	2 96	20.4
ALGOMA:									
1898	12,711	389,192	3,214,175	93,967	22,910	3,331,052	70,288	5 53	21.1
1897	12,371	400,786	2,416,184	95,238	19,000	2,530,322	56,806	4 59	21.5
1896	11,376	335,518	2,257,931	87,145	15,400	2,360,526	57,713	5 07	24.4
THUNDER BAY:									
1898	6,311	265,897	2,657,957	101,550	35,525	2,795,032	65,497	10 38	23.4
1897	6,394	265,668	2,270,227	91,045	20,050	2,384,322	59,089	9 24	21.8
1896	5,722	259,202	2,364,152	99,300	25,200	2,488,652	63,180	11 04	25.4
RAINY RIVER:									
1898	6,364	29,344	1,670,192	147,075	4,000	1,821,267	48,296	7 59	26.5
1897	5,692	21,945	1,467,830	119,924	3,300	1,591,054	30,291	5 32	19.0
1896	4,420	21,345	1,281,272	127,369	6,700	1,415,341	26,690	6 04	18.9

ASSESSMENT AND TAXATION.

TABLE IV. Summary statement for the Province of Ontario of the Population and Area, as shown by the assessment rolls, and of the assessed Values and amount of Taxes imposed, as shown by the collection rolls, together with the average rate of taxes per head of population assessed as resident, and rate in mills on the dollar of total assessed value for the thirteen years, 1886 to 1898, classified as rural (townships), urban (towns and incorporated villages) and cities.

Municipalities.	Population.	Number of acres assessed.	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Personal property.	Taxable income.	Total.	Total.	Per head.	Mills on \$
1893.			\$	\$	\$	\$		\$ c.	
Townships..	1,110,894	23,392,584	445,877,275	2,696,081	236,701	448,810,060	4,461,474	4 02	9.9
Towns	314,820	156,142	85,576,404	6,421,936	1,531,032	93,529,372	2,095,791	6 66	22.4
Villages	134,747	98,346	28,594,694	1,902,735	270,596	30,768,025	570,912	4 24	18.6
Cities	440,889	42,034	211,334,978	16,547,241	8,195,157	236,077,376	5,094,789	11 56	21.6
Total....	2,001,350	23,689,106	771,383,351	27,567,996	10,233,486	809,184,833	12,222,966	6 11	15.1
1897.									
Townships..	1,113,530	23,360,428	441,578,264	2,609,661	234,553	444,722,478	4,407,005	3 96	9.9
Towns	312,947	156,338	83,529,999	6,343,065	1,565,482	91,438,546	2,069,444	6 61	22.6
Villages	133,560	99,240	28,314,870	1,903,926	278,911	30,497,707	569,884	4 27	18.7
Cities	430,940	40,744	212,621,741	17,125,503	7,219,402	236,966,646	5,160,592	11 93	21.8
Total....	1,990,977	23,656,750	766,344,874	27,982,155	9,298,348	803,625,377	12,206,925	6 13	15.2
1896.									
Townships..	1,112,500	23,172,408	444,056,842	2,792,097	268,444	447,117,383	4,292,741	3 86	9.6
Towns	306,001	154,520	83,194,812	6,456,590	1,617,776	91,269,208	2,005,132	6 55	22.0
Villages	132,451	99,507	27,855,878	1,881,680	268,281	30,005,839	557,003	4 21	18.6
Cities	420,934	40,548	221,941,541	16,963,651	7,620,011	246,523,203	5,267,909	12 51	21.4
Total....	1,972,286	23,466,983	777,049,103	28,094,018	9,774,512	814,917,635	12,122,785	6 15	14.9
1895.									
Townships..	1,109,631	23,114,356	445,375,439	2,762,179	279,641	448,417,259	4,473,269	4 03	10.0
Towns	300,655	152,685	84,965,120	6,999,896	1,681,819	93,646,835	2,021,455	6 72	21.5
Villages	130,889	94,566	27,572,493	1,848,480	290,037	29,711,010	544,111	4 16	15.5
Cities	416,215	40,548	225,079,539	16,852,113	7,759,410	249,691,062	5,277,594	12 68	21.1
Total....	1,957,390	23,402,155	782,992,591	28,462,668	10,010,907	821,466,166	12,316,429	6 29	15.0
1894.									
Townships..	1,103,828	23,039,610	448,216,984	2,899,503	359,616	451,476,103	4,579,044	4 15	10.1
Towns	297,194	153,164	84,363,681	7,115,395	1,586,389	93,065,465	1,955,980	6 58	21.0
Villages	126,387	94,407	26,799,930	1,931,015	276,943	29,007,928	526,813	4 17	18.4
Cities	408,810	40,560	227,578,882	17,323,301	7,727,691	252,629,874	5,258,475	12 86	20.8
Total....	1,936,219	23,327,741	786,959,477	29,269,214	9,950,679	826,179,370	12,320,312	6 36	14.9
1893.									
Rural	1,096,984	22,959,280	448,311,559	2,957,944	359,600	451,629,103	4,629,028	4 22	10.3
Urban	415,410	246,780	111,724,238	8,923,403	2,029,029	122,676,670	2,449,452	5 90	20.0
Cities	397,665	40,258	226,179,831	17,581,320	7,463,128	251,224,279	5,444,180	13 69	21.7
Total....	1,910,059	23,246,318	786,215,628	29,462,667	9,851,757	825,530,052	12,522,600	6 56	15.2

ASSESSMENT AND TAXATION. — *Continued.*

Municipalities.	Population.	Number of acres assessed.	Assessed values.				Taxes imposed for all purposes.		
			Real property.	Personal property.	Taxable income.	Total.	Total.	Per head.	Mills on \$
1892.			\$	\$	\$	\$	\$	\$ c.	
Rural	1,102,467	22,885,464	448,566,182	3,089,202	410,274	452,065,658	4,599,442	4 17	10.2
Urban	413,396	228,829	110,909,898	8,452,309	2,469,164	121,911,371	2,375,995	5 75	19.5
Cities	393,664	40,258	222,997,515	18,928,105	9,808,478	251,234,098	4,828,133	12 26	19.2
Total ...	1,909,527	23,154,551	782,553,595	30,469,616	12,187,916	825,211,127	11,803,570	6 18	14.3
1891.									
Rural	1,116,347	22,825,325	450,559,809	3,101,663	408,892	454,070,364	4,544,291	4 07	10.0
Urban	410,545	227,075	101,462,152	8,570,172	2,343,484	120,375,808	2,305,025	5 61	19.1
Cities	393,229	39,498	216,091,585	19,480,460	8,849,177	214,401,222	4,918,432	12 44	20.1
Total ...	1,922,121	23,091,898	776,113,546	31,132,295	11,601,553	818,847,394	11,767,748	6 12	14.4
1890.									
Rural	1,118,252	22,676,390	448,916,986	3,178,614	371,488	452,467,088	4,473,108	4 00	9.9
Urban	410,530	223,434	105,353,091	7,878,483	2,170,656	115,402,231	2,161,644	5 27	18.7
Cities	388,762	39,498	202,907,967	19,300,295	8,538,688	239,746,950	4,262,733	10 96	18.5
Total ...	1,917,544	22,939,322	757,178,044	30,357,395	11,080,832	798,616,271	10,897,485	5 68	13.7
1889.									
Rural	1,130,069	22,554,717	447,114,443	3,470,224	392,553	450,977,220	4,507,717	3 99	10.0
Urban	400,890	215,532	96,567,320	7,773,945	2,112,533	106,453,798	1,993,623	4 97	18.7
Cities	373,951	38,498	177,634,932	18,826,684	8,013,182	204,474,798	3,746,858	9 97	18.3
Total ...	1,906,901	22,808,747	721,316,695	30,070,853	10,518,268	761,905,816	10,248,198	5 37	13.5
1888.									
Rural	1,133,046	22,348,502	433,596,047	26,624,345	395,430	460,615,822	4,491,780	3 97	9.8
Urban	393,461	211,707	90,416,111	7,956,694	2,039,724	100,413,029	1,884,918	4 79	18.8
Cities	353,638	36,961	160,239,217	19,345,906	8,040,596	187,625,719	3,540,264	10 01	18.9
Total ...	1,880,145	22,597,170	684,251,875	53,926,945	10,475,750	748,654,570	9,919,962	5 28	13.3
1887.									
Rural	1,150,138	22,145,295	428,372,441	27,881,683	416,039	456,170,163	4,431,720	3 89	9.7
Urban	377,389	212,322	83,497,910	7,616,982	2,222,704	93,337,596	1,759,248	4 66	18.8
Cities	330,930	36,163	140,795,414	18,226,775	8,781,990	167,804,179	3,109,145	9 40	18.5
Total ...	1,848,457	22,393,780	652,665,765	53,225,440	11,420,733	717,311,938	9,300,113	5 03	13.0
1886.									
Rural	1,148,856	21,990,134	424,356,317	27,289,098	452,220	452,097,645	4,388,401	3 82	9.7
Urban	360,005	204,446	78,521,775	7,384,126	2,172,192	88,078,093	1,670,848	4 64	19.0
Cities	319,614	35,373	129,231,535	16,925,710	8,047,616	154,204,921	2,950,136	9 23	19.1
Total ...	1,828,495	22,229,953	632,109,687	51,598,934	10,672,038	694,380,659	9,009,385	4 93	13.0

* This large decrease in personal property was due to a change in the Assessment Act, which exempted farm live stock, etc.

ASSESSMENT ROLL—STEAM BOILERS.

TABLE V. Showing the number of Steam Boilers as placed on the Assessment Rolls in Townships, Towns, Villages and Cities of the Province of Ontario for the eight years 1891-1898.

Municipalities.	1898.			1897.			Totals					
	Townships.	Towns and Villages.	Total.	Townships.	Towns and Villages.	Total.	1896.	1895.	1894.	1893.	1892.	1891.
Counties:												
Essex	143	60	203	173	57	230	200	195	209	196	204	165
Kent	205	83	293	178	82	260	249	233	270	269	247	158
Egan	116	43	159	134	47	181	178	169	167	160	156	140
Norfolk	110	34	144	83	34	117	119	119	114	130	101	93
Halldmand	87	16	103	80	15	95	94	105	112	106	101	83
Welland	49	31	80	56	29	85	76	86	83	74	79	63
Lambton	322	220	542	279	214	493	514	504	533	548	471	421
Huron	214	132	346	211	121	332	315	314	299	276	289	277
Bruce	183	86	269	166	102	268	251	260	232	254	237	207
Grey	190	62	252	176	71	247	238	240	208	179	158	153
Simcoe	206	132	338	207	127	334	332	358	349	337	312	221
Middlesex	218	52	270	200	47	247	237	267	236	227	232	217
Oxford	184	81	265	175	79	254	228	225	217	207	227	220
Brant	38	7	45	47	7	54	55	66	62	49	43	48
Perth	149	41	190	134	37	171	191	160	162	163	149	136
Wellington	114	77	191	111	77	188	167	171	174	169	162	157
Waterloo	128	145	273	89	174	263	254	237	238	217	117	195
Dufferin	57	25	82	51	20	71	78	77	79	70	69	84
Lincoln	87	32	119	73	32	105	109	104	100	83	95	73
Wentworth	118	26	144	95	33	128	155	120	122	114	112	102
Halton	47	43	90	48	40	88	78	81	85	79	86	87
Peel	58	14	72	59	10	69	66	76	85	69	63	55
York	151	102	256	145	95	240	243	203	211	189	177	164
Ontario	129	61	190	139	61	200	183	177	166	193	162	153
Durham	62	30	92	51	31	82	84	91	92	93	103	78
Northumberland	122	32	154	97	33	130	121	120	110	111	88	65
Prince Edward	58	27	85	67	27	94	93	79	80	78	79	84
Lennox & Addington	76	13	89	69	14	83	84	81	76	65	80	75
Frontenac	96	5	101	81	4	85	79	73	63	60	53	51
Leeds	125	56	181	123	59	182	164	164	135	139	135	133
Grenville	36	28	64	49	31	80	67	67	66	59	60	60
Dundas	72	17	89	70	17	87	93	83	76	71	70	65
Stormont	54	37	91	54	37	91	84	87	92	81	76	78
Glengarry	73	14	87	45	14	59	86	64	58	44	63	36
Prescott	66	18	84	68	18	86	92	82	87	78	69	59
Russell	57	26	83	60	26	86	74	65	52	52	49	36
Carlton	79	7	86	65	7	72	64	51	58	52	39	40
Renfrew	109	55	164	100	58	158	161	149	147	114	101	62
Lanark	64	74	138	63	74	137	128	126	127	105	115	89
Victoria	75	40	115	65	37	102	103	98	101	101	92	47
Peterborough	63	35	98	57	37	94	92	85	89	90	82	80
Haliburton	16	16	32	15	15	30	15	13	13	11	5	7
Hastings	137	54	191	143	54	197	186	213	210	232	214	143
Muskoka	57	47	104	42	63	105	93	95	91	58	83	40
Perry Sound	51	23	74	60	24	84	73	70	72	68	60	45
Nipissing	29	21	50	29	18	47	36	32	25	23	13	12
Manitoulin	13	9	22	9	9	18	18	15	19	15	16	12
Algoma	34	65	99	30	33	63	89	70	85	47	49	20
Cities:												
Belleville	35	35	70	34	34	68	33	33	30	29	20	...
Brantford	56	56	112	74	74	148	79	69	78	73	48	39
Chatham	31	31	62	31	31	62	31	32	72	30	29	20
Guelph	35	35	70	33	33	66	34	35	30	31	29	28
Hamilton	249	249	498	236	236	472	232	225	528	201	202	182
Kingston	53	53	106	54	54	108	55	55	60	65	59	54
London	95	95	190	130	130	260	95	93	93	107	107	87
Ottawa	69	69	138	69	69	138	65	65	60	54	54	...
St. Catharines	35	35	70	27	27	54	21	29	30	30	22	25
St. Thomas	22	22	44	21	21	42	37	17	53	53	27	...
Stratford	55	55	110	54	54	108	54	52	48	47	55	...
Toronto	77	77	154	122	122	244	219	240	184	184	135	118
Windsor	26	26	52	35	35	70	31	13	14	15	22	20
Totals	4,930	3,181	8,111	4,621	3,256	7,877	7,778	7,583	7,807	7,127	6,722	5,662

FINANCIAL STATEMENT—

TABLE VI. Showing an abstract statement of the Receipts, Disbursements, Assets and Liabilities

Township municipalities.	Receipts.										
	Balance from 1896	Municipal and school taxes	Licenses.	Fees, rents, fines, etc.	Interest and dividends.	Refund of money invested.	Borrowed for current expenses	Borrowed on debentures for schools.	Borrowed on debentures for drainage.	Borrowed on debentures for other purposes.	Miscellaneous.
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
ESSEX :											
1 Anderton	671	10,916	63	10			3,511		300		706
2 Colchester, N	3,368	17,247		3	25		15,000		6,140		619
3 Colchester, S	299	22,724			2		400	800	100		682
4 Gosfield, N	373	10,101		19	18		300		2,160		137
5 Gosfield, S		11,080	43	200	6		1,000	1,100	2,694		427
6 Maidstone	1,368	14,496	70		20		4,500		2,400		264
7 Malden	495	7,063	87				1,900				42
8 Mersea	141	27,952	135	28					17,053		1,024
9 Pelee Island	190	8,984	31	2	5		1,700				17
10 Rochester	765	10,878	224	5					3,762		401
11 Sandwich, E	683	9,660	573	6		240	3,700		400		1,348
12 Sandwich, S	1,070	9,369	73		16		1,700		2,927		1,176
13 Sandwich, W	1,168	10,959	365	35							
14 Tilbury, N	2,607	8,933	123		364	267			15,305		2,115
15 Tilbury, W	4,908	11,294	272	17					16,216		2,686
Totals.....	18,106	191,656	2,056	325	456	507	33,711	1,900	69,457		*11,644
KENT :											
1 Camden	2,579	13,250	53						4,697		129
2 Chatham		34,533	60	5			34,169	1,000	13,871		+2,086
3 Dover	252	33,284	258	49	67		1,354		13,096		2,218
4 Harwich	1,211	42,760	309	56			7,000	1,669	504		179
5 Howard	539	20,679	47				1,500		1,625		277
6 Orford	1,056	15,659	119				6,400		1,809		71
7 Raleigh	9,293	29,140	90	16	386			614	22,653		5,051
8 Romney	1,390	12,367		4	137		3,062		22,605		1,729
9 Tilbury, E		22,506		5	82	1,031	9,915	4,005	16,122		997
10 Zone	602	5,476		11			1,071	1,900			40
Totals.....	16,922	229,654	936	140	672	1,031	64,471	9,188	96,982		\$12,777
ELGIN :											
1 Aldborough	572	28,891	441	28	244	4,212	16,963		7,490		67
2 Bayham	478	17,466	158	27	9		3,742		100		+185
3 Dorchester, S	1,606	8,512		1			1,715				36
4 Dunwich	1,537	21,851	73		2		5,926		300		879
5 Malahide	826	21,575	50		91		4,000				66
6 Southwold	11,831	22,844	192	31			3,500		2,687		394
7 Yarmouth.....	4,185	28,338	188	23	24		8,808		200		139
Totals.....	21,035	149,477	1,102	110	370	4,212	44,654		10,777		1,766
NORFOLK :											
1 Charlottetown	547	12,189	30				200				65
2 Houghton		7,768	23	8			362	1,000			20
3 Middleton	76	9,589	39		30						375
4 Townsend	119	14,402		10			804				14
5 Walsingham, N	38	11,973	60				1,200				80
6 Walsingham, S	52	11,549	23	9			1,478				385
7 Windham		13,314	85	4							143
8 Woodhouse	1,107	10,446	23	1	24		2,700				510
Totals.....	1,939	91,230	283	32	54		6,744	1,000			1,592

* Including \$4,009 premiums on debentures sold, and \$5,678 from other municipalities.

† Including balance on hand from previous year but omitted from returns.

‡ For support of indigent, \$102. § Including \$1,515 premium on debentures sold, and \$7,480 from other municipalities.

TOWNSHIP MUNICIPALITIES.

of the Township municipalities in the Province of Ontario, for the year ending December 31st, 1897.

Total receipts	Disbursements.											
	Allowances, salaries and commissions.	Law costs.	Other expenses of municipal government.	Roads and bridges.	Buildings and other works	Board of Health.	Support of the poor and other charities.	County treasurer for levies.	Payment on account of schools and education	Drainage works.	Sinking Fund investments and deposits.	Clergy Reserve and other investments and deposits.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
16,177	769	39	179	2,285		56	181	1,068	3,524	1,601		
42,402	836	46	189	1,148			227	1,056	3,259	6,357		
25,007	685	285	291	1,667			84	1,885	6,086	410		
13,108	512	59	286	448		11	87	1,111	2,890	2,693		
16,550	714	138	225	2,389		59	198	1,727	3,240	1,343		
23,118	911	715	279	2,559	222	31	274	1,919	8,114	3,525		
9,587	547		145	1,993			28	1,135	3,073			
46,333	1,476	57	290	2,756		4	504	2,462	6,022	9,153		
10,929	387	55	54	246		2	15	100	1,000	1,905		
16,032	786	3	191	1,601		15	174	1,691	3,702	3,632		
16,609	1,035	1,696	194	698		139	318	814	3,786	1,184		
16,332	512	29	168	1,631			96	1,015	2,699	3,037		
12,527	738	44	176	1,973		20	76	400	4,910	679		
29,714	942	2	186	323			155	1,015	3,628	1,400		
35,393	625		420	1,879		39	78	937	3,121	17,693		
329,818	11,475	3,148	3,223	23,595	222	376	2,495	18,235	56,014	54,612		
20,708	829	48	277	1,147	*400	13	184	2,665	3,523	4,838		
85,724	3,112	3,862	449	4,092		86	676	7,065	9,126	14,535		
50,578	1,511	655	606	949	†519	90	613	4,483	6,202	10,921		
53,688	1,827	350	502	5,223		145	266	10,508	8,898	4,092		
24,667	1,029	41	281	3,277		23	390	4,365	6,048	2,220		
25,114	9 6	126	323	2,178	145	25	394	1,000	5,867	1,496		
67,237	1,405	1,117	656	1,924	171	30	441	4,314	8,387	33,913		
41,294	1,500	912	172	1,021		33	31	1,027	21,514			
54,663	1,398	4	313	3,487		39	621	2,418	10,128	17,249		781
9,100	641	10	131	664	†226	19	60	911	3,698	357		
432,773	14,168	7,125	3,770	23,962	1,461	503	3,676	38,756	83,391	89,621		781
58,908	1,015	275	536	4,156		320	53	3,404	7,449	6,994	6,148	
22,165	935	4	457	2,897		34	139	1,995	8,035	746		
11,870	644		140	2,365	60	37	49	2,761	2,969	924		
30,568	1,808	15	282	6,956		235	79	4,197	5,559	2,304		
26,608	958	47	390	4,052		19	33	4,832	6,515	253		
41,479	1,074	1,237	465	5,928		81	30	5,157	7,326	1,857		
41,905	1,479	5 354	612	7,028		132	164	7,953	7,786	223		
233,503	7,913	6,932	2,882	33,382	60	858	547	30,299	45,639	13,301	6,148	
13,031	602		162	1,235		13	88	2,496	5,529	201		
9,181	490	17	155	1,219	235	138	86	1,336	4,810	8		
10,109	728		316	2,394		50	85	1,653	3,555	262		
15,349	1,018	9	115	1,949	7	11	39	4,265	7,050			
13,351	578	10	116	1,714			76	1,771	4,495			
13,496	499		180	1,232		31	41	2,737	3,326			
13,546	715	1,308	285	1,333			36	2,889	6,028	269		
14,811	539	5	73	1,045		43	186	2,040	3,573			
102,874	5,169	1,349	1,402	12,121	242	286	637	19,187	38,366	740		

* Road graders.

† Including \$460 for road graders.

‡ Road graders.

FINANCIAL STATEMENT—

TABLE VI.—Abstract

Township municipalities.	Disbursements.—Continued.							Assets.			
	School debentures redeemed.	Drainage debentures redeemed.	All other debentures redeemed.	Refund of moneys borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arr. ars.	Sinking Fund investments and deposits.	All other investments and deposits.
	£	£	£	£	£	£	£	£	£	£	£
ESSEX :											
1 Anderton	100	1,668		2,911	595	866	15,842	335	10,136		
2 Colchester, N	451	7,169	399	16,000	1,728	471	39,327	3,075	17,911		
3 Colchester, S	563	3,513	1,784	2,489	2,105	817	22,644	2,363	17,116		
4 Gosfield, N	247	2,185		1,200	432	514	12,655	453	6,419		
5 Gosfield, S		1,464	704	1,023	1,226	1,316	15,725	825	8,385		
6 Maidstone	120	2,820		2,500	753	726	22,468	650	15,749		
7 Malden	51			2,000	127	230	9,329	258	4,293		
8 Mersea	238	4,762	731	4,000	2,361	1,430	36,246	10,087	18,093		
9 Pelee Island	336	896		1,875	1,331	145	8,347	2,582	3,140		
10 Rochester		1,030	385		202	350	13,662	2,370	9,362		
11 Sandwich, E	146	2,709		2,100	1,042	230	16,091	518	10,752		
12 Sandwich, S		2,690		2,125	585	1,114	15,731	601	10,678		
13 Sandwich, W	143	1,535			174	683	11,751	\$976	265		
14 Tilbury, N	91	995			434	2,404	11,575	18,139	6,442		733
15 Tilbury, W	1,153	3,570	300		1,474	332	31,621	3,772	10,262		
Totals	3,639	36,997	4,303	38,223	14,569	11,688	282,814	47,004	149,003		733
KENT :											
1 Camden		2,986	270		651	62,277	20,108	600	9,557		
2 Chatham	664	9,835		26,664	3,714	734	84,614	1,110	37,805		
3 Dover	321	7,138		12,930	2,472	893	50,303	275	13,454		
4 Harwich	599	5,581		9,000	1,394	2,266	50,621	3,067	5,277		
5 Howard		1,256		1,500	269	911	21,610	3,057	6,324		
6 Orford	402	1,583		4,500	609	35	20,059	5,055	7,838		
7 Raleigh	410	7,036	202		4,079	197	64,282	2,955	16,872		
8 Romney	161	1,478	174	4,499	1,334	632	34,488	6,806	9,507		
9 Tilbury, E	300	8,606	101	4,077	4,703	273	54,498	165	28,821		
10 Zone		794		860	208	151	8,730	370	3,824		
Totals	2,767	46,293	747	64,400	19,493	8,369	409,313	23,460	139,279		
ELGIN :											
1 Aldborough		1,471		23,957	2,206	107	58,091	817	16,229	9,127	
2 Bayham	221	287	1,112	3,000	1,891	412	22,165		9,016		
3 Dorchester, S				1,715	40	104	11,808	62	990		
4 Dunwich	261	1,594		5,926	731	334	30,281	287	6,654		
5 Marshide		657	127	4,000	595	489	22,967	3,641	936		
6 Southwold	766	1,268		7,577	469	467	33,702	7,777	1,538		
7 Yarmouth		183		8,808	763	601	41,086	819	2,349		
Totals	1,248	5,460	1,239	51,983	6,695	2,514	220,100	13,403	37,712	9,127	
NORFOLK :											
1 Charlotteville			939	868	668	145	12,946	85	3,814		8,764
2 Houghton			100	150	145	292	9,181		1,361		
3 Middleton	175	389			255	206	10,068	41	2,676		
4 Townsend				700	11	175	15,349		1,053		
5 Walsingham, N	100			4,200	51	109	13,220	131	2,490		
6 Walsingham, S			1,877	2,010	1,344	219	13,496		3,066		
7 Windham				163		93	13,119	427	1,576		
8 Woodhouse			2,000	2,500	359	89	12,452	2,359	50		
Totals	275	389	4,916	10,591	2,833	1,328	99,831	3,043	15,525		8,764

* Including \$366 in hands of executors of late treasurer. † Including \$1,178 refunds of drainage surplus. ‡ Financial returns very unsatisfactory. § Auditors' balance. || Including \$1,549 paid to Tilbury W. on drainage. ¶ Including \$5,950 from county rate. N. R. taxes returned. a Including \$432 interest on county rate. b Including \$2,035 paid to other townships.

TOWNSHIP MUNICIPALITIES.—Continued.

Statement.—Continued.

Assets.—Continued.					Liabilities.								
School lands and buildings.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures.	Drainage debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.	
£	£	£	£	£	£	£	£	£	£	£	£	£	£
.....	700	452	11,623	852	200	.....	.....	2,796	.....	9,127	1,166	14,141	1
.....	850	354	22,190	.....	3,388	.....	2,015	18,411	5,267	5,000	983	35,664	2
16,575	1,775	1,504	39,333	1,482	4,507	12,830	800	18,614	1,881	4,400	1,265	45,779	3
.....	1,700	1,419	9,991	1,193	165	.....	.....	8,692	.....	305	1,051	11,406	4
.....	.....	749	9,959	1,512	2,213	9,293	1,100	13,806	.....	1,000	1,495	30,419	5
6,000	800	.....	23,199	1,918	3,723	.....	558	10,257	.....	4,500	.....	20,956	6
.....	1,000	29	5,580	1,135	949	.....	235	.....	.....	1,963	332	4,614	7
.....	3,200	3,126	34,506	2,421	950	8,891	512	47,043	.....	11,990	.....	71,807	8
5,500	6,943	22,403	40,568	.....	1,268	.....	722	22,257	.....	1,700	60	26,067	9
.....	1,400	250	13,382	1,267	2,649	.....	.....	6,189	404	.....	169	10,678	10
.....	350	9,571	21,191	1,232	3,489	.....	2,179	11,786	.....	2,550	203	21,438	11
7,200	860	8,200	27,639	858	2,652	.....	.....	10,590	.....	3,200	3,801	21,101	12
.....	1,000	.....	2,241	738	.....	.....	471	1,322	.....	.....	1	2,532	13
.....	.....	503	25,817	1,015	2,571	.....	409	22,272	.....	.....	\$2,854	29,121	14
.....	2,500	33,288	49,822	.....	.....	3,476	4,323	41,739	.....	.....	324	49,862	15
35,275	23,078	81,848	336,941	15,623	28,724	34,490	13,324	235,774	7,552	33,745	25,694	394,926	
.....	.....	866	11,023	2,133	2,763	.....	.....	16,316	.....	.....	1,165	22,377	1
.....	2,500	11,199	52,614	6,303	875	.....	1,617	53,134	.....	34,169	2,663	100,761	2
.....	900	3,868	18,497	4,019	416	.....	1,126	46,115	.....	1,354	65	53,095	3
.....	1,200	7,638	17,182	693	.....	.....	1,542	14,183	.....	.....	1,942	18,360	4
.....	1,500	6,017	16,898	3,716	12	.....	.....	6,611	.....	.....	1,004	11,343	5
.....	.....	.....	12,893	2,131	3,053	.....	4,410	8,324	.....	3,100	936	21,954	6
.....	1,000	90,373	111,200	319	8,774	.....	2,964	88,691	.....	.....	.....	100,748	7
.....	8,000	.....	24,313	1,039	1,994	9,352	1,275	36,721	.....	.....	.....	50,381	8
10,000	700	27,105	46,791	2,199	2,427	4,337	3,836	96,338	.....	9,915	615,606	134,708	9
.....	.....	.....	4,194	.....	.....	.....	1,900	125	.....	1,786	.....	3,811	10
10,000	15,800	127,066	315,605	22,233	11,859	22,513	18,670	368,558	.....	50,324	23,381	517,538	
.....	2,600	4,056	32,829	3,972	992	.....	21,000	16,758	.....	17,542	2,049	62,313	1
.....	6,200	484	15,700	2,328	902	32,829	2,226	3,176	.....	811	1,577	43,849	2
10,000	1,000	185	12,237	.....	.....	.....	.....	.....	.....	583	20	603	3
.....	400	4,314	11,655	6,866	318	.....	3,261	12,369	.....	.....	1,123	23,397	4
.....	.....	230	4,807	.....	77	3,752	.....	7,636	.....	.....	415	11,880	5
.....	1,000	318	10,633	6,017	18	.....	1,000	6,053	.....	.....	600	13,688	6
.....	1,275	229	4,672	4,078	.....	.....	.....	3,481	.....	.....	31	7,590	7
10,000	12,475	9,816	92,533	23,261	2,307	36,581	27,487	49,473	.....	18,936	5,815	163,860	
.....	1,000	.....	13,163	1,484	893	12,389	.....	.....	.....	.....	150	14,916	1
.....	1,735	23,741	6,837	.....	355	2,714	1,000	.....	.....	362	.....	4,431	2
.....	800	2,320	5,837	.....	804	.....	2,275	1,762	.....	.....	.....	4,847	3
.....	.....	1,218	2,271	.....	557	.....	1,218	.....	.....	104	73	1,952	4
.....	1,213	.....	3,773	866	.....	.....	200	.....	.....	.....	.....	1,066	5
.....	1,500	.....	4,566	1,407	.....	24,780	.....	.....	.....	118	.....	26,305	6
.....	1,825	305	4,133	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
.....	.....	.....	2,409	.....	.....	.....	.....	.....	.....	2,400	.....	2,400	8
8,073	7,584	42,989	3,757	2,609	39,883	4,693	1,762	.....	.....	2,984	223	55,911	

* Drainage contracts. † Including Big Marsh Drainage—not previously returned. ‡ Including \$1,906 to Sandwich East. § Estimated liabilities to Tilbury West on drains (\$1,651 in 1897). ¶ Including advances on drains. ¶ Advances to drains and schools. a Due township on account of land sales, \$2,500. b \$15,469 of this are balances due on sundry drain accounts. c Including \$4,807 due Sinking Fund. d Including \$626 interest on county rates. e Including \$1,000 advance to school section, and \$2,714 re railway deb.

TABLE VI. FINANCIAL STATEMENT—

Township municipalities.	Receipts.										
	Balance from 1896.	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Interest and dividends.	Refund of money invested	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for drainage.	Borrowed on debentures for other purposes.	Miscellaneous.
HALDIMAND:	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1 Canboro'	266	4,848	1				300				160
2 Cayuga, N.	1,054	5,377	47	2	24						11
3 Cayuga, S.	483	2,222		11	3						70
4 Dunn	475	3,411	12								
5 Moulton		5,947	1	2	337	2,571	2,571				10
6 Oneida	324	8,064		4			1,000				8
7 Rainham	721	5,284	95	2	519	18					138
8 Seneca	470	7,956	131	2	3		200				5
9 Sherbrooke	1	1,093	1		80	175					31
10 Walpole	1,878	17,272	123		42		990				90
Totals	5,672	61,474	411	23	1,008	2,764	5,061				523
WELLAND:											
1 Bertie	1,823	10,396	463	18			*200				803
2 Crowland	114	4,719	33	2			300				54
3 Humberstone	554	7,837	282	5			200				40
4 Pelham	319	7,808		7	1,016	1,919					21
5 Stamford		8,713	74	174	33	1,000					374
6 Thorold	412	8,935	71				600				
7 Wainfleet	69	11,585		5	1,500				203		5
8 Willoughby	63	4,330	83	8							51
Totals	3,354	64,323	1,006	219	2,549	2,919	1,400		203		1,348
LAMBTON:											
1 Bosanquet	957	13,677	36		15		1,200		567		435
2 Brooke	2,954	25,526	72	8	22		4,800		5,034		145
3 Dawn	90	21,096	47	21	83	560	500		8,060		861
4 Enniskillen	1,210	30,274	79	1					8,948		846
5 Euphemia		10,024	117	31			700				106
6 Moore	2,454	30,964	424	2					5,799		116
7 Plympton		21,756	96	5			4,752		3,778		169
8 Sarnia		24,740	70				7,000		2,373		502
9 Sombra	4,188	21,648	239	2	125	130		1,300	2,401		105
10 Warwick	2,956	12,820	31				3,255	1,200	950		9
Totals	14,809	212,525	1,211	70	245	690	22,207	2,500	38,410		3,294
HURON:											
1 Ashfield	854	13,790	124				1,300	800			284
2 Colborne	38	8,357	126				1,300				161
3 Goderich	3,331	10,023					1,100				192
4 Grey	464	15,725	86	4			1,900	+1,375			324
5 Hay	1,106	16,406	115	30			1,350				169
6 Howick	2,564	13,814	203	17	98		+1,660				334
7 Hullett	112	12,915	65	22	27	1,823	1,500				249
8 McKillop	1,305	10,045	67		787						319
9 Morris	1,478	12,831	59				3,150				174
10 Stanley	481	10,464	94		30	1,600					352
11 Stephen	123	27,933	347	170	28	2,000	3,500				181
12 Tucker-Smith	425	9,931	69		950	1,800					408
13 Turnberry	1,510	6,228	24		9		\$1,123				172
14 Usborne	3,363	11,051	47								231
15 Wawanosh, E.	1,960	6,753	30		12		900				181
16 Wawanosh, W.	391	9,000	2				400				163
Totals	19,505	195,266	1,458	243	1,941	7,223	19,183	2,175			3,894

* Balance unpaid on rock crusher. † Including \$800 issued in 1896, but omitted from returns for 1896.
 ‡ Including \$660 from Sinking Fund. § Including \$235 on note for road grader.

TOWNSHIP MUNICIPALITIES.

Disbursements.													
Total receipts.	Advances, salaries and commissions.	Law costs.	Other expenses of municipal government.	Roads and bridges.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	County treasurer for levies.	Payment on account of schools and education.	Drainage works.	Sinking Fund investments and deposits.	Clergy Reserve and other investments and deposits.	
\$	\$	%	%	%	%	%	\$	\$	\$	\$	%	\$	
5,575	232		77	150		2	50	1,134	3,289				1
6,515	322		113	414		12	35	1,862	2,770				2
2,789	116	2	33	145			57	900	1,287				3
5,898	300	5	63	132	100	4	190	1,073	1,605				4
11,439	344	14	207	496		11	131	997	2,140	1,632		2,746	5
9,400	415		136	2,047		23	187	1,970	3,285				6
6,777	361	2	108	416		7	145	1,990	2,854				7
8,767	483		151	1,142		1	220	2,446	3,392				8
1,381	24	2	81	209		1	38	333	423			234	9
20,395	844	2	300	2,299		40	595	5,149	7,754				10
76,946	3,441	27	1,219	7,450	100	101	1,648	17,854	28,799	1,663		2,980	
15,803	578	40	291	1,079	800	56	22	3,387	3,983	312			1
5,222	247		110	382		3	2	1,128	2,077				2
8,918	570		356	652	50	25	14	2,341	3,519	133			3
11,090	570	2	203	1,165		24	8	2,645	4,182			1,919	4
10,368	494	47	346	1,162	223	30	34	2,053	4,528				5
10,018	525		202	751		10	7	3,198	3,857				6
13,367	602	201	445	820		10	126	2,083	5,206	824			7
4,535	227		88	427		9	10	1,708	2,003				8
77,321	3,813	290	2,031	6,438	1,073	169	223	18,543	29,355	1,269		1,919	
16,887	884	96	204	2,126	327	31	61	2,231	4,936	1,124			1
38,561	651	176	335	5,311		20	26	4,919	6,145	6,639			2
31,318	926	*581	333	2,669		30	212	1,202	5,050	5,091			3
41,358	1,760	83	394	4,484		38	96	2,890	8,573	5,722			4
10,978	496	13	185	1,559		142	2,690	3,669	211				5
39,759	1,439	419	371	3,436		411	3,188	9,250	6,956				6
30,566	827		208	4,457	262	9	248	3	6,202	4,030			7
34,685	1,045	196	204	2,097		15	95	1,188	3,218	6,331			8
30,638	990	439	226	3,648		12	125	1,844	7,351	2,608			9
21,221	693	10	103	3,250		153	266	2,213	7,163	1,036			10
295,961	9,711	2,013	2,563	33,037	589	308	1,682	22,368	61,557	39,748			
17,152	798	30	259	2,806			32	2,501	6,986	24			1
9,982	469		210	1,576			41	2,542	3,638				2
14,646	604		223	2,491	75	10	15	2,605	3,417				3
19,878	800	1,058	368	1,797		16	188	4,056	6,437	370			4
19,176	567		193	3,288		55	19	5,079	5,561				5
18,690	915	78	177	1,581		73	77	2,895	6,462	72	+1,486		6
16,713	700		184	3,396		36	18	3,219	4,332			2,122	7
12,523	766	203	200	2,356		15	92	3,054	4,044			368	8
17,692	714	3	201	2,444		21	17	4,415	3,721				9
13,921	592	3	114	2,611	1245	9	56	2,751	4,215			2,130	10
34,282	822	2	226	4,010	190	91	57	5,347	11,057	221		1,093	11
13,583	745	32	165	2,015		25	2	2,885	4,666	1,341		1,029	12
9,066	662		109	438	235	32	23	1,389	3,261	198			13
14,692	589		103	2,211		28		2,518	5,357				14
9,846	464		117	1,533		5	7	1,619	3,112				15
9,956	561	33	147	1,226		11		3,638	3,442				16
50,888	10,768	1,442	2,996	35,784	745	427	644	50,413	79,608	2,226	1,486	6,742	

* Including \$560 damages. + Including \$660 in Tp. account. † Road grader.

TABLE VI. FINANCIAL STATEMENT—

Township municipalities.	Dis-bursements.—Continued.							Assets.				
	School debentures redeemed.	Drainage debentures redeemed.	All other debentures redeemed.	Refund of money borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.	
HALDIMAND :	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1 Canboro'				400	14	34	5,282	293				
2 Cayuga, N.						75	5,603	912				
3 Cayuga, S.						10	2,550	239	308			
4 Dunn						40	3,543	355				
5 Moulton	150	300		1,790	213	263	11,439		187			4,384
6 Oneida				1,000	18	7	9,088	312	65			
7 Rainham						26	5,909	868				4,676
8 Seneca				200	2	49	8,086	681				
9 Sherbrooke							1,295	86	345			1,894
10 Walpole	600			990	225	208	19,006	1,389	58			
Totals	750	300		4,280	477	712	71,801	5,135	963			10,953
WELLAND :												
1 Bertie	507	246			420	44	11,763	2,038	2,437			
2 Crowland		197		500	67	46	4,761	461	1,925			
3 Humberstone	272	414		200	46	87	8,679	239	1,406			
4 Pelham				250	1	24	10,993	97	1,050			17,576
5 Stamford	294			76	343	145	9,770	598	3,812			
6 Thorold	100			600	24	265	9,539	479	2,889			
7 Wairflet	200	1,620			445	293	12,875	492	3,815			25,000
8 Willoughby						55	4,627	8	1,532			
Totals	1,373	2,477		1,626	1,351	959	72,909	4,412	18,876			42,576
LAMBTON :												
1 Bosanquet	245	1,897		1,200	283	268	16,013	874	93			
2 Brooke	685	5,053		5,100	1,676	217	37,553	1,008	7,586			
3 Dawn	*900	5,907		560	1,546	1,908	26,915	†4,403	20,045			
4 Enniskillen	150	7,201			2,164	470	34,025	7,333	30,671			
5 Fuphemia			730	634	297	133	10,759	219	3,592			
6 Moore		7,129		1,000	2,566	178	36,043	3,716	15,372			
7 Plympton	292	2,619		9,580	1,000	819	30,556		5,775			
8 Sarnia	250	4,518		13,475	1,980	49	34,661	24	2,652			
9 Sombra	715	7,151	735		2,875	366	29,085	1,553	24,058			214
10 Warwick	240	848		4,420	376	450	21,221		3,311			
Totals	3,577	42,923	1,465	35,969	14,463	4,858	276,831	19,130	113,255			214
HURON :												
1 Ashfield	728			1,300	194	69	15,727	1,425	2,579			
2 Colborne				1,300	39	65	9,878	104	275			
3 Goderich				1,100	24	119	10,583	4,063	255			
4 Grey	728	657		1,900	612	92	19,079	799	1,120			
5 Hay	544	953		1,350	494	400	18,503	673	210			
6 Hawick				1,000	847	103	15,766	2,924	2,608	4,016		
7 Hullett		520	29	1,500	442	40	16,538	175	179			2,121
8 McKillop							11,098	1,425				14,960
9 Morris				3,150	258		14,944	2,748	922			
10 Stanley	215				11		12,952	69	398			530
11 Stephen		1,903	2,000	4,200	648	134	22,601	2,281	257			
12 Tuckersmith					62		12,867	716				17,681
13 Turnberry		160		888	34	9	7,438	1,628	209			
14 Usborne					85		10,891	3,801	21			
15 Wawanosh, E.				940	16	9	7,780	2,056	232			
16 Wawanosh, W.		100	31	400	27	125	9,741	215	1,670			
Totals	2,215	4,293	2,060	18,988	3,646	1,303	225,786	25,102	10,535	4,016		35,281

* Including \$340 omitted from 1896 returns. † Including \$3,341 unexpended drain balance and \$1,053 held for refunds, drain rates and debenture payments.

TOWNSHIP MUNICIPALITIES.—Continued.

Assets.—Continued.				Liabilities.									
School lands and buildings.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures.	Drainage debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.	
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	
			293										1
			912										2
	1,220		1,767										3
	1,000		1,355										4
			4,571							2,571	75	2,571	5
6,500	1,000		7,877										6
	400		5,943										7
	1,300		1,981										8
	600		2,925										9
	700		2,147				3,700					3,700	10
6,500	6,220		29,771		8		3,700			2,571	75	6,354	
	4,900	*7,518	16,893		1,899		6,695	823		300		9,717	1
	675	+679	3,690	921	1,544			636				3,101	2
6,000	2,250	15	9,910	1,128								1,128	3
	4,180	103	23,005	1,086							+527	1,613	4
12,000	8,000	1,755	26,165		3,788		6,663					10,401	5
			3,368	998	2,262						112	3,372	6
13,000	2,160	5,623	50,100	3,026			800	5,623				9,449	7
	1,200		2,740	280	922						39	1,241	8
31,000	23,315	15,693	135,871	7,439	10,365		14,158	7,082		300	678	40,022	
	302	4,289	5,558					4,170			\$733	4,903	1
13,950	75	1,066	23,685				2,255	29,741		3,700	1,804	37,500	2
9,600	1,000	#15,491	50,539		5,767		620	21,274		500		28,161	3
17,500	930	27,322	83,756	1,999	1,056		1,800	37,554			41	42,450	4
8,000	400	103	12,314		576				5,236	724	431	6,967	5
	1,150	26,877	47,115	2,367	3,158		1,700	34,712			21	41,958	6
	1,360	11,019	17,424	2,920			1,057	15,894		252	1,539	21,662	7
		21,049	23,725				800	33,090		1,000	305	35,155	8
9,800	1,500	a42,862	79,987	1,539	4,407	7,420	3,150	41,386			10	57,912	9
12,000	500	40	15,851	1,678			960	6,137		385	b1,413	10,573	10
70,850	7,217	149,290	359,956	10,503	14,964	7,420	12,342	223,958	5,236	6,561	6,297	287,281	
13,000	150		17,154	2,998			2,113				202	5,318	1
			379										2
			4,318	3,006								3,006	3
	1,000	7,558	10,477	1,300			2,921	4,699		2,577		11,497	4
25,000	1,500		27,383				1,589	8,579			500	10,668	5
	2,130		11,878	3,423		14,700				d 660		18,783	6
			2,476					8,413	210			8,623	7
			16,375								c 370	370	8
	300	58	4,028	2,656	141							2,797	9
	550		1,507										10
	1,500		4,038					8,172				8,172	11
8,000		584	26,984										12
	235		2,072	1,667				200		235		2,102	13
	423		4,247	3,021								3,021	14
			2,288	1,942								1,942	15
7,000	1,000	100	9,385	405					231		123	759	16
53,000	8,790	8,300	145,029	20,418	141	14,700	6,628	30,063	441	3,472	1,195	77,058	

* Advances to schools and drains. † Advance for drains not previously returned. ‡ School interest not paid over. § On drain account. ¶ Including \$15,447 advance on drains. ¶ Consisting mainly of advances on tile drainage and sums due from other municipalities as share of drain expenses. a Including \$42,541 advances on drains. b Including \$1,215 drain balances. c Report of 1894 gave \$1,915 of liability to Tp. of Grey on Drainage Debt, but as the debentures therefor have not yet been sold, the liability is omitted here. d Due Sinking Fund.

TABLE VI. FINANCIAL STATEMENT.

Township municipalities.	Receipts.									
	Balance from 1896.	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Interest and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for drainage.	Borrowed on debentures for other purposes.
BRUCE :	%	\$	%	\$	%	\$	%	%	%	%
1 Albemarle . . .	319	4,952	53		526		1,950			262
2 Amabel . . .	1,456	17,081	153	1	853					*1,834
3 Arran . . .	2,504	6,273		6	2,922		224			764
4 Brant . . .	626	15,036	180	6	635	2,500				299
5 Bruce . . .	1,026	10,124	71	4	46	18	350	900		297
6 Carrick . . .	977	13,168	292	8	170		500			1,104
7 Culross . . .	698	8,774	97	6			300			291
8 Eastnor . . .	3	4,649	186	4	189	233	200			527
9 Elderslie . . .		11,279		4	1,833	222	1,175			1,032
10 Greenock . . .		9,500	223	2						57
11 Huron . . .	1,793	12,407	245	45	31					613
12 Kincardine . . .	161	9,555	24				625			873
13 Kinloss . . .	1,494	7,475	61	4	9					74
14 Lindsay . . .	230	2,713			7	180	774			247
15 Saugeen . . .	924	5,300	26				350			48
Totals . . .	12,121	138,236	1,611	90	7,221	3,153	6,448	900		7,712
GREY :										
1 Artemesia . . .	225	11,955	168	13	374	550	1,649	1,400		885
2 Bentinck . . .	483	18,190	193	11	2,399		518			682
3 Collingwood . . .	52	15,733	53	12	150	4,402	4,278			262
4 Derby . . .	238	6,458	33	10			1,550			379
5 Egremont . . .	1,673	11,672	45		2,525	21,843				631
6 Euphrasia . . .	127	10,492	31	3						210
7 Glenelg . . .	472	11,118	48	4	590	180	200			1,073
8 Holland . . .	338	7,643	162							321
9 Keppel . . .	42	12,393	25		1,369	1,260		1,100		680
10 Normanby . . .	938	16,586	302	28	1,026					333
11 Osprey . . .	72	6,476	82				260			306
12 Proton . . .	11	9,536	86		33					747
13 St. Vincent . . .	3,039	11,554		1			1,300			250
14 Sarawak . . .	200	4,815			16		250			80
15 Sullivan . . .	312	10,612	53	5						490
16 Sydenham . . .		14,863	67				460			422
Totals . . .	8,247	180,036	1,338	57	8,482	28,235	10,485	2,500		7,271
SIMCOE :										
1 Aijala . . .	177	8,440	138				1,400			162
2 Essa . . .	665	13,612	137				2,399			64
3 Flos . . .	806	15,910	165	12	43	789				321
4 Gwillimbury, W. . .	1,350	10,043	27	1						29
5 Innisfil . . .	1,116	12,856	98							420
6 Matchedash . . .	143	802			25	100				101
7 Medonte . . .	601	12,931	266	25	2		1,250			155
8 Nottawasaga . . .	3,364	23,135	293	16			1,000			293
9 Orillia . . .	3,857	11,733	29	3			1,500			123
10 Oro . . .	633	11,913	39	14	63					151
11 Sunnidale . . .	3,381	10,247	108	36			2,000			38
12 Tay . . .	1,012	9,720	123							15
13 Tecumseth . . .	1,375	15,561	80	15	10		1,600			27
14 Tiny . . .		15,988	26				4,334			+1,834
15 Tossorontio . . .	2,304	6,942	146	4						
16 Vespra . . .	849	9,829		3			500			190
Totals . . .	21,633	189,662	1,675	129	143	889	15,983			4,023

* Including \$682 adjustment of Sinking Fund account as reported in 1896. † Including \$460 grant from Ont. Government re N. W. B. Road.

TOWNSHIP MUNICIPALITIES.—Continued.

Disbursements.

Total receipts.	Allowances, salaries and commissions.	Law costs.	Other expenses of municipal government.	Roads and bridges.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	County Treasurer for levies.	Payment on account of schools and education.	Drainage works.	Sinking Fund investments and deposits.	Other investments and deposits.	
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	
8,052	473	3	119	687		11	45	1,242	1,035		1,126		1
21,128	721	21	331	1,000		52	96	2,125	6,315		1,663		2
12,693	639		155	1,221		70	68	2,244	2,936		2,416		3
19,382	782	16	250	1,830		46	242	3,110	5,848		1,860	3,000	4
12,436	558	17	173	2,135			248	2,548	5,012		363		5
16,219	730		310	1,664		82	227	2,818	7,166		419		6
10,076	588	24	242	1,431	4	55	103	2,259	4,548	137			7
5,991	396	36	126	840			69	185	2,360	5	1,003		8
15,545	574		169	1,040		32	28	2,299	4,103		2,935		9
9,782	610	10	234	1,485		67	288	1,289	4,825			31	10
15,134	720	86	174	3,098		78	406	2,697	5,978				11
10,738	615	6	179	1,838		16	141	2,603	4,580				12
9,117	615		134	1,159		20	317	1,701	3,439				13
4,151	442		166	1,012			54	50	1,172				14
6,848	551	7	140	1,241		5	19	1,339	1,942				15
177,492	9,014	220	2,902	21,681	4	534	2,351	28,459	61,259	142	11,785	3,031	
16,739	751	291	345	2,471	118		292	2,046	6,599	7	370	400	1
22,471	680	3	846	1,657		38	229	4,646	5,490		3,675		2
24,962	1,034	28	425	3,583		147	332	2,341	6,660		4,837		3
8,688	621		225	1,635		46	91	1,328	2,551				4
38,389	462	64	149	1,261			153	2,414	3,855		25,331		5
10,863	762	2	201	1,038		72	117	1,884	6,460				6
13,685	553		173	1,104		20	242	3,065	3,446		1,557		7
8,464	632		170	892		38	103	1,723	3,870				8
16,809	968	177	181	951		28	375	1,228	*6,270	80	3,119		9
19,213	782		354	2,269		36	143	2,818	6,331		3,226		10
7,196	764		208	876		22	296	1,529	3,295				11
10,413	666		182	1,272		11	33	1,788	5,044	64	214		12
16,144	776	56	274	2,028		66	502	2,286	5,165				13
5,361	416		122	1,827		75	45	406	1,333		239		14
11,472	471	5	106	1,096		31	150	2,179	6,047	280			15
15,812	949	12	206	2,386	+160	43	177	2,208	5,772				16
246,681	11,287	638	4,167	25,866	578	673	3,280	33,789	78,164	431	42,618	400	
10,317	627		81	1,139		12	34	2,837	3,126				1
16,877	909		113	2,107	‡500	21	271	3,656	5,595				2
18,045	684	83	244	2,048		25	116	2,037	4,784	1,118	150		3
11,450	616		189	1,113			282	3,135	4,926				4
14,490	951	21	348	1,517		40	291	3,705	5,965				5
1,171	127	6	46	174				220	318				6
15,230	756	21	236	2,189			255	2,942	6,362				7
28,201	1,502	188	312	3,127		45	150	10,514	6,822				8
17,245	828		382	1,397		58	58	2,452	3,840				9
12,813	709	2	393	1,043		12	312	3,287	5,382				10
15,310	714		267	1,058		100	297	3,463	3,739	38			11
10,870	1,012	54	195	1,430		16	289	\$1,036	5,146				12
18,668	667	1,686	84	2,663		7	281	4,445	6,096				13
23,182	756	802	250	2,446	122	24	189	3,670	9,429	163			14
9,396	414	171	105	887		10	47	2,619	2,601				15
11,371	802	25	372	1,278		5	89	1,129	4,757				16
234,137	12,095	2,559	3,627	25,641	622	375	2,961	51,087	78,888	1,319	150		

* Including \$1,100 proceeds of debentures issued in 1896.
 ‡ Per Treasurer's letter, 27th May, 1899.

† Road machine.

‡ Road Graders

TABLE VI. FINANCIAL STATEMENT—

Township municipalities.	Disbursements—Continued.							Assets.			
	School debentures redeemed.	Drainage debentures redeemed.	All other debentures redeemed.	Refund of moneys borrowed for current expenses.	Interest on loans advanced on debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.
BRUCE:	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1 Albemarle				2,100	781	111	7,733	319	4,783	8,650	1,200
2 Amabel	753			682	2,922	587	17,268	3,860	5,880	13,240	
3 Arran					2,700	244	12,693		3,517	43,000	
4 Brant				245	846	140	18,215	1,167	3,163	12,060	3,000
5 Bruce				350	217	75	11,690	1,146	89	915	
6 Carrick				500	365	970	15,251	968	44	2,516	
7 Culross				300	4	36	9,731	345	750		
8 Eastnor					912	97	5,979	12	4,179	5,223	35
9 Elderslie				1,284	2,735	60	15,259	286	111	43,475	
10 Greenock	209			17	107		9,172	610	3,967		31
11 Huron	843				150	2	14,232	902	2,527		
12 Kincairdine				625	10	116	10,729	9	1,334		
13 Kinloss						33	7,418	1,699	22		
14 Lindsay	200			680	83	290	4,149	2	5,730		
15 Saugeen	209			350	66	40	5,909	739	15		
Totals	2,214			7,133	11,898	2,601	165,428	12,064	36,111	129,069	4,266
GREY:											
1 Artemesia				1,669	243	13	15,615	1,124	789	2,713	
2 Bentinck	147				4,054	49	21,414	1,057	6,069	59,259	
3 Collingwood	192		140	4,278	628	282	24,877	85	916	4,837	
4 Derby	100	60		1,550	66	71	8,364	324	98		
5 Egremont					3,690	4	37,343	1,046		56,836	
6 Euphrasia	187				69	5	10,797	66	4,607		
7 Glenelg	180			200	1,235	7	11,782	1,903	800	18,602	
8 Holland	407				138	31	8,004	460	1,191		
9 Keppel	576	289			2,397	170	16,809		7,832	31,307	
10 Normanby					1,740	113	17,812	1,401		29,173	
11 Osprey				200	4	2	7,196		4,522		
12 Proton	287	419			325	107	10,412	1	2,277	970	
13 St. Vincent	198			1,300	46	37	12,734	3,410	524		
14 Sarawak	121			257	355		4,702	659	830	984	
15 Sullivan	150				65	137	10,717	755	32		
16 Sydenham	161			2,964	120	46	15,504	308			
Totals	2,706	768	140	12,418	15,085	1,074	234,082	12,599	30,487	204,681	
SIMCOE:											
1 Adjala		357		1,400	68	89	9,770	547	1,703		
2 Easa	379			2,149	166	79	15,936	941	436		
3 Flos	1,535		767	1,350	1,197	52	16,190	1,856	8,628	838	
4 Gwillimbury, W.						35	10,286	1,164			
5 Innisfil	215				57	44	13,164	1,326	3,395		
6 Matchedash	50	50			25	7	1,023	143	886		475
7 Medonte	337		190	1,000	201	3	14,492	738	3,700		
8 Nottawasaga	210		3,100	1,000	367	210	27,577	624	9,796		
9 Orillia	445			1,500	302	*5,194	16,436	809	5,421	\$	
10 Oro	471				82	50	11,748	1,065	4,563		
11 Sunnidale		104		2,000	198	183	12,101	†3,709	807		
12 Tay	250				8	116	9,552	1,318	8,162		
13 Tecumseth				1,600	40	119	17,688	980	26		
14 Tiny	204	134	532	1,008	2,350	583	22,182		9,450		
15 Tossoronto			800		51	125	7,860	1,536	97		
16 Veaspra	283			1,500	114	542	10,896	475	3,640		
Totals	4,379	645	5,389	14,507	5,226	7,431	216,901	17,236	60,710	838	475

* Including \$5,187 deficit in Tp. Treasurer's accounts as per Tp. Auditors' Report. † Including \$1,313 drainage funds. \$ Omitting \$900 previously reported but now dropped from returns.

TOWNSHIP MUNICIPALITIES.—Continued.

Assets—Continued.

Liabilities.

School lands and buildings.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures.	Drainage debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.	
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	
1,409	460	4,425	16,361	673	1,456	10,000	900			2,000	374	14,730	1
800	2,491	93	27,866			43,000	5,265					48,938	2
9,800	1,000		49,808		528	45,000				224	217	45,969	3
1,665		103	19,488			12,000					468	12,468	4
265	736	113	12,950				2,500					2,500	5
1,000		113	5,286				3,200		4,000		23	7,223	6
		736	1,208								383	883	7
			10,450	779	1,343		2,750	6,685	7,600	200		19,357	8
			44,872			45,000						45,000	9
			4,608	2,146	87		1,791					4,024	10
12,000	*800		16,229				2,337					2,337	11
	406		1,749										12
	600	13	2,334								3		13
		13	5,745	201	684					1,424	906	3,215	14
		33	787				950				56	1,006	15
21,800	8,405	8,026	219,741	3,799	4,098	155,000	19,693	6,685	11,600	3,348	2,430	207,153	
	810		5,436				5,900					5,900	1
	1,500	456	66,385			65,000	2,453			518		67,971	2
	825		7,794	600			2,482		7,280		130	10,492	3
			1,247				200	420				620	4
		62	57,882			60,000						60,000	5
	1,000	17	4,735	2,100	111		1,113				90	3,414	6
	120		22,322			20,000	368					20,868	7
		350	1,771				2,094					2,098	8
	1,100		39,489	+2,349		35,000	1,590	5,176			100	44,215	9
			31,674			29,000						29,000	10
		173	4,522	1,705	1,059					60	500	3,324	11
		217	3,421		241		2,068	3,272		+181	90	5,852	12
	49		4,151	2,549			209				238	2,996	13
			2,522			7,500	128			1,239	85	7,952	14
	1,500		2,287				1,050					1,050	15
	525		833				1,058			+460		1,518	16
	7,429	1,275	256,471	6,954	3,760	216,500	20,717	8,868	7,280	1,458	1,233	266,770	
			2,250	2,489							632	3,121	1
	500	218	2,095	790			1,270			250	90	2,400	2
10,350	340	1,634	23,646	1,924	3,287	20,807	4,906					30,924	3
	250		1,414										4
			4,721	2,837			728					3,565	5
1,200		17	2,726	37	395		150	325				907	6
8,000	1,950		14,388	1,248			2,116		629	250	70	4,313	7
		580	11,000	4,955	2,600		705			1,000	1,500	10,760	8
11,250	375		17,855	1,093	1,900		4,505	227		a	14	7,739	9
	1,150	10	6,788	3,291			888				80	4,259	10
	500	50	5,066	2,735	518			2,793			70	6,118	11
	75		9,555	1,015	2,322						200	3,537	12
		3	1,009										13
		67,786	17,236	1,871		46,467	630	3,302		3,334		55,604	14
5,500			7,133	125	391					1,688		2,204	15
	1,000		5,115	1,794			1,502			500	150	3,946	16
36,300	6,140	10,298	131,997	26,204	11,413	67,274	17,400	6,649	629	7,022	2,806	139,397	

* Omitting \$600 written off per last return. † By a clerical error \$2,556 liability for school rates in report for 1896 appeared as a liability for Co. rates. ‡ Due Sinking Fund. § Due Sinking Fund in 1896 but not then reported. ¶ Note for road machine. a Omitting \$900 previously reported as due Sinking Fund. b Including \$4,481 Penetang's share of Ry. Bonus not previously reported.

TABLE VI. FINANCIAL STATEMENT.

Township municipalities.	Receipts.										
	Balance from 1896	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Interests and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for drainage.	Borrowed on debentures for other purposes.	Miscellaneous.
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
MIDDLESEX :											
1 Adelaide	6,047	10,306	44	2							12
2 Biddulph	1,551	11,393	134				2,500	270			83
3 Caradoc	9,803	17,818	58	24					1,598		400
4 Delaware	1,649	6,231	19	21	120		895				129
5 Dorchester, N.	4,871	18,586	92		346		1,500		544		522
6 Ekfrid		18,319	42	17			2,021		447		1,136
7 Lobo	32	21,331	118	6							482
8 London	17,072	40,622	416	21	261						506
9 McGillivray	1,425	14,569	19	16	53		1,550				163
10 Metcalfe	898	11,925	19	10			1,349				25
11 Mosa	229	10,539							4,407		130
12 Nissouri, W.	3,087	15,132	46	3			2,700				26
13 Westminster	14,413	23,133	151		252						*967
14 Williams E	1,715	8,892	42				700				54
15 Williams, W	49	6,659					1,000				166
Totals	62,841	235,455	1,200	120	1,032		14,215	270	6,996		4,789
OXFORD :											
1 Blandford	2,462	7,079	37		45				163		18
2 Blenheim	229	20,996	324	502	45		2,000		2,141		356
3 Dereham	5,321	20,213	5	67	300				5,392		564
4 Nissouri, E.	1,385	10,361	82				700				32
5 Norwich, N.	2,368	10,487		5	22		700				132
6 Norwich, S.	2,474	9,192		31	16						89
7 Oxford, E.	283	10,570	17		62						2
8 Oxford, N.	749	6,671	143		11		1,000				44
9 Oxford, W.	2,486	7,502		495	60						246
10 Zorra, E.	6,236	20,465	128	285	140	45	1,000	400	4,272		90
11 Zorra, W.	4,116	10,750	27	1	540	5,014	1,800		1,865		12
Totals	28,109	134,286	764	1,993	1,241	5,059	7,200	400	13,833		1,755
BRANT :											
1 Brantford		22,601	49	3	2,828	27,233	9,000				1,007
2 Burford	1,905	17,762		5	415						176
3 Dumfries, S.	1,180	12,784	53	50	14		800				43
4 Oakland	416	3,150			295	135					34
5 Onondaga	886	5,432	33								3
Totals	4,387	61,729	135	59	3,552	27,368	9,800				1,263
PERTH :											
1 Blanshard	4,700	12,121	32		5		1,475				581
2 Downie	2,709	11,687	126				2,300				16
3 Easthope, N.	3,965	12,037	136								2,843
4 Easthope, S.	2,429	7,389	199	144							276
5 Ellice	1,279	24,947	162		45		1,000		14,705		2,614
6 Elma	5,874	27,232	167		74		3,700		7,998		890
7 Fullarton	1,131	12,553	55	4			2,000				459
8 Hibbert	1,853	10,169	83	16	3						432
9 Logan	3,348	12,720	55	8	62		2,000				1,795
10 Mornington	816	14,333	365		61		1,860				367
11 Wallace	36	12,176	32		70		309			10,000	715
Totals	28,140	157,366	1,412	172	320		14,644		22,703	10,000	10,988

* Including \$99 cash in hand of committee.

TOWNSHIP MUNICIPALITIES.—Continued.

Disbursements.													
Total receipts.	Allowances salaries and commissions.	Law costs.	Other expenses of municipal government.	Roads and bridges.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	County treasurer for levies.	Payment on account of schools and education.	Drainage works.	Sinking Fund investments and deposits.	Other investments and deposits.	
£	£	£	£	£	£	£	£	£	£	£	£	£	£
16,411	640	180	164	2,174	225	62		3,600	3,772	65			
15,931	729	35	180	2,805		35	27	1,790	5,274	102			
29,701	1,073	209	280	4,021	165	42	63	3,969	5,751	1,324			
9,064	520	113	93	2,573	228	13	75	1,920	2,593	201			
26,461	842	45	181	4,474		302	529	4,004	6,486	687			
21,982	821	1,164	268	4,431	25	10	17	3,338	3,702	2,825			
21,969	677	34	223	3,052	7	2	169	4,491	4,985	7			
58,898	2,021	11	473	13,109	102	188	378	9,688	10,734	241		25	
17,795	744		122	3,350	128	8	3	2,835	5,475				
14,226	643	77	162	2,460	234	53	10	2,526	2,501	242			
15,305	1,050	42	203	1,891	175		7	3,019	3,551	1,692			
20,988	865	52	193	3,834	1	61	25	4,609	4,266				
38,916	1,225	98	284	6,054	53	64	20	6,232	7,502				
11,403	526	6	104	3,057		1	55	3,291	2,945	138			
7,868	297	1	96	1,467		30	157	2,330	1,825				
326,918	12,673	2,037	3,026	58,782	1,343	871	1,535	58,242	71,862	7,524			25
9,969	541	10	75	895		16	29	1,895	2,286	427			
26,593	1,263	56	185	5,507		45	225	4,905	8,190	1,007			
32,474	1,250	157	247	3,349		28	345	4,767	7,214	7,057			
12,560	424		95	2,740	250	28		3,561	3,950				
13,715	658	7	121	3,120		42	53	2,593	3,903	149			
11,802	413	9	393	2,446			38	1,947	4,379				
10,934	508		77	1,503		23		2,659	3,330	432			
8,618	477		90	1,921		43	12	1,546	2,000	409			
10,789	596	20	128	1,264		18	15	1,928	3,173	673			
33,061	722		176	5,721		122	114	4,398	6,646	3,146			
24,125	639	31	207	3,918	*250	83	35	4,819	4,406	1,648			1,500
191,640	7,496	290	1,794	32,384	500	448	865	35,018	49,477	14,848			1,500
62,721	2,147	790	590	2,319		2	975	4,213	13,578				25,677
20,264	1,000	197	317	2,884		46	828	3,290	7,869	10			
14,924	840	470	234	2,060		109	435	2,725	5,700				
4,030	293	44	74	180	19	15	112	539	1,448				135
6,354	435		105	704		10	252	1,064	2,041				
108,293	4,715	1,501	1,320	8,147	19	182	2,602	11,831	30,636	10			25,812
18,914	686	55	270	2,680		54	84	4,165	4,126				
16,838	716	21	176	3,035		41	140	3,900	4,141				
18,981	644	4	227	1,786		25	277	3,409	3,538	194			2,421
10,437	536		141	1,399	240	64	7	2,078	2,609				
44,752	1,002	226	439	4,600		18	210	3,233	4,372	9,033			
45,935	907	1,232	297	3,555		25	229	7,760	4,831	2,805			
16,202	632	20	195	3,926	30	68	8	3,517	3,892				
12,556	686	5	170	2,214		25	72	3,410	3,380	69			
19,988	781	342	214	3,481		42	289	3,370	3,926	1,139			1,231
17,804	786	142	198	3,733		28	57	2,907	4,419	65			
23,338	667	25	165	1,478		29	42	3,421	4,759	131	709		
245,745	8,093	2,072	2,572	31,917	270	419	1,415	41,170	43,993	13,436	709		3,652

* New road grader.

TABLE VI.—FINANCIAL STATEMENT—

Township municipalities.	Disbursements.—Continued.							Assets.			
	School debentures redeemed.	Drainage debentures redeemed.	All other debentures redeemed.	Refund of moneys borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking fund investments and deposits.	All other investments and deposits.
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
MIDDLESEX:											
1 Adelaide				3,700	323	162	11,044	5,367			
2 Biddulph	180				29	29	15,209	722	4,036		
3 Caradoc	389	1,377			481	193	19,337	10,364	1,508		
4 Delaware	285	219			99	132	9,064		7,278		
5 Dorchester, N.	754	627		1,500	241	348	21,020	5,441	3,144		6,400
6 Ekfrid	316	2,288		1,103	484	590	21,982		6,191		
7 Lobo	449				222	633	14,951	7,018	5,609		
8 London	211				100	2,303	39,584	19,314	6,966		25
9 McGillivray				1,550	40	514	14,769	3,026	169		
10 Metcalfe	242	1,276		2,849	125	328	13,728	498	3,776		
11 Moss	200	1,127			247	1,764	14,968	337	9,790		
12 Nissouri, W.				3,700	100	430	18,136	2,852	3,714		
13 Westminster	447	303			228	795	23,335	15,581	3,122		
14 Williams, E.				700	15	53	10,891	512	5,049		
15 Williams, W.				1,590	31	44	7,868		7,228		
Totals	3,473	7,217		16,692	2,736	8,318	255,886	71,032	67,580		6,425
OXFORD:											
1 Blandford		642			172	194	7,182	2,787			
2 Blenheim	559	178		2,000	653	172	24,950	1,643	25		
3 Dereham		2,441			726	629	23,210	4,264	55		5,000
4 Nissouri, E.				700	7	117	11,872	688	140		
5 Norwich, N.		231		700	33	211	11,821	1,894	40		
6 Norwich, S.	235				51	196	10,107	1,695	21		127
7 Oxford, E.					127	8,659	2,275	322			
8 Oxford, N.		190		1,000	60	41	7,789	829	3		
9 Oxford, W.					112	7,927	2,862				
10 Zorra, E.	323	2,117		1,000	508	174	25,165	7,896	648		
11 Zorra, W.		1,423		1,800	366	84	21,109	3,016	5,661		11,027
Totals	1,117	7,222		7,200	2,574	2,057	164,791	29,849	6,915		16,154
BRANT:											
1 Brantford	429			9,000	754	357	60,831	1,890	3,944		+68,742
2 Burford		991			186	232	17,850	2,414			8,600
3 Dumfries, S.	217			800	403	49	14,042	882	26		
4 Oakland			400		295	62	3,616	414	13		5,269
5 Onondaga			512		52	56	5,231	1,123	41		
Totals	646	991	912	9,800	1,690	756	101,570	6,723	4,024		82,611
PERTH:											
1 Blanshard	266			1,475	76	57	13,994	4,920	443		
2 Downie				2,300	47	162	14,679	2,159	23		
3 Easthope, N.	400	1,302			404	100	14,731	4,250	184		+2,421
4 Easthope, S.		571			152	517	8,364	2,073			
5 Ellice	100	2,158		2,300	1,091	94	24,926	15,826	1,499		
6 Elma		784	4,935	7,815	1,251	860	37,286	8,649	1,370		
7 Fullarton				2,000	47	355	14,690	1,512	11		
8 Hibbert	450				68	32	10,611	1,945			
9 Logan	116	718	1,127	2,000	483	212	19,501	487	268		1,231
10 Mornington		267	1,075	1,860	1,454	278	17,209	595			
11 Wallace			10,000	612	1,178	11	23,227	111	4,622	3,479	
Totals	1,332	5,740	17,137	20,362	6,251	2,678	203,218	42,527	8,420	3,497	3,652

* Including discount on taxes.

* Including \$2,307 special dep. for schools for distribution to same.

‡ Law costs in Gibson case.

TOWNSHIP MUNICIPALITIES.—Continued.

Assets.—Continued.				Liabilities.								
School lands and buildings.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures.	Drainage debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1,500	10	6,877	3,561								100	3,661
800	75	5,633	1,704	234			1,890			1,800	2	5,630
2,800		14,672	3,928				2,889	6,922				13,739
1,428		8,706	1,885				943	449		895		4,172
	379	15,364	3,961				829	1,877			392	7,059
14,000	800	1,263	22,254	3,897			1,540	7,115		1,021	962	14,535
	1,000		13,627	4,436			4,160				448	9,044
	2,000	2,096	30,401	9,587	444		2,096					12,127
7,500	1,100		11,795									
8,000	1,400	400	14,074	2,506			241	202			1	2,950
		116	10,243	2,988	276		500	8,052			1,044	12,860
			6,566	3,561						2,053		5,614
		320	19,023	6,163			2,761	320				9,244
			5,561	3,257								3,257
		484	7,712	2,306	2,225					1,000	262	5,793
29,500	12,828	5,143	192,508	53,740	3,179		17,849	24,937		6,769	3,211	109,685
	240		3,027					3,804				3,804
	1,300		2,968				9,133	1,963			20	11,116
		88	9,407					19,871				19,871
		2	830								55	55
	200		2,134					202			1,169	1,371
	2,300		4,143				781					781
	600	18	3,215		14							14
			832									
7,500	500	324	11,186								40	40
	725	871	10,140				1,469	11,659			5,762	18,890
	400		20,104					9,691				9,691
7,500	6,265	1,303	67,986		14		11,383	47,190			7,046	65,633
		7,648	82,224		1,734		8,008				2,788	12,530
	500		11,514					2,718				2,718
	700		1,603				7,516					7,516
			5,696			5,500						5,500
	3,000		4,164						537			537
	4,200	7,648	105,205		1,734	5,500	15,524	2,718	537		2,788	28,801
31,000	780	417	27,560	4,165			882				100	5,147
	950		3,132	1,030							92	1,122
	680	81	7,616				1,200	6,787			*1,750	9,737
	160		2,173					3,214				3,214
10,700		24,263	52,288	3,106			700	28,295		9,800	8,479	50,380
		1,291	11,310		41	12,065	420	16,541			23	29,090
11,000	800		13,323									
	750		2,695				900					900
8,000	150	2,273	12,709					6,691			+1,938	8,629
			595	1,622		30,925		1,627			58	34,232
	400		8,630	3,421		20,000				+1,075	60	24,556
50,700	4,910	28,325	142,031	13,544	41	62,990	4,102	63,155		10,875	12,500	167,007

* Liability on account of E. B. C. Drain.

† Including \$1,231 on drains.

‡ Due Sinking Fund.

TABLE VI.—FINANCIAL STATEMENT

Township municipalities.	Receipts.										
	Balance from 1896.	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Interest and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for drainage.	Borrowed on debentures for other purposes.	Miscellaneous.
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
WELLINGTON :											
1 Arthur	518	10,250	28	3	3		1,000				462
2 Eramosa		10,945	200	8	27						59
3 Erin	192	11,900	128								
4 Garafraxa, W.	79	10,895		1	20		1,300				625
5 Guelph	139	9,898	85		768	730	1,335				219
6 Luther, W.	4	8,774	28	7	3		1,200				728
7 Marborough	5,398	13,051	87		54			*600			55
8 Minto	201	15,223	26		783	450	300				71
9 Nichol		7,985	110		4						164
10 Peel	5,567	15,826	344		17		1,745				54
11 Pilkington	357	5,667	30								41
12 Puslinch		10,890	135	38	499	2,783					195
Totals	12,455	131,304	1,201	57	2,178	3,963	6,880	600			2,663
WATERLOO :											
1 Dumfries, N.		9,916	103				600				17
2 Waterloo	1,314	27,198	415	127	1,853	1,675		500			463
3 Wellesley		16,155	513	2	574	100	1,300				28
4 Wilmot	3,818	17,833	488	87	141		3,700				73
5 Woolwich	3,921	17,770	155	39	450						34
Totals	9,053	88,872	1,674	255	3,018	1,775	5,600	500			616
DUFFERIN :											
1 Amaranth	71	13,137		13			1,500		736		
2 Garafraxa, E.	172	8,960		190			1,500				15
3 Luther, E.	3	9,706		2			2,500		620		43
4 Melancthon	82	13,918	34				4,000				14
5 Mono	252	12,496	55		3		1,200				1
6 Mulmur	222	13,257	71		1		1,810				72
Totals	802	71,474	160	205	4		12,500		1,356		145
LINCOLN :											
1 Caistor	1,409	5,523			8		600				
2 Clinton	181	10,573					600				
3 Gainsborough	63	10,049		5	4		600				63
4 Grantham	94	9,698	60	3							3
5 Grimsby, N.	266	7,060		+142	13		1,400				10
6 Grimsby, S.	142	7,129	120	3	14						
7 Louth	750	7,939	94	5	33						187
8 Niagara	69	7,973	95		17		500				
Totals	2,974	65,944	359	158	92		3,700				263
WENTWORTH :											
1 Ancaster	3,093	12,473	83	2,282	1,493	2,832					561
2 Barton	2,977	7,927	219	127	802	8,185		3,000			
3 Beverly		14,018	86	3	586	2,360					197
4 Binbrook	1,439	5,417	41	7							92
5 Flamborough, E.	1,728	7,441	374		16						2
6 Flamborough, W.	57	10,691	167	9	717	4,330	1,400		1,325		164
7 Glanford	816	5,077	49		316	5,360					
8 Saltfleet	4,515	9,426	123		340	108					259
Totals	14,625	72,470	1,142	2,428	4,273	23,115	1,400	3,000	1,325		1,275

* Not reported as a receipt by treasurer but appears as a liability. † Including \$100 from T. G. & B. Electric Railway.

TOWNSHIP MUNICIPALITIES.—Continued.

Total receipts.	Disbursements.												
	Allowances, salaries and commissions.	Law costs.	Other expenses of municipal government.	Roads and bridges.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	County treasurer for levies.	Payments on account of school and education.	Drainage works.	Sinking Fund investments and deposits.	Other investments and deposits.	
\$	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	
12,264	876	3	169	1,412	...	76	11	3,710	4,285	59	...	...	1
11,239	861	13	136	1,846	...	32	15	3,483	4,028	17	...	...	2
12,220	656	36	165	1,451	...	24	7	4,227	5,585	...	...	...	3
12,920	660	53	192	4,059	...	32	35	3,272	2,797	73	...	...	4
13,174	748	...	245	1,885	...	94	...	3,376	4,364	3	...	765	5
10,744	616	15	148	715	...	55	10	1,201	3,026	137	51	...	6
19,245	868	15	153	1,840	...	53	20	4,001	6,699	142	...	...	7
17,034	898	20	166	1,773	11	44	5	2,822	5,237	...	3,603	13	8
8,253	658	...	200	938	...	40	7	2,453	3,349	...	...	...	9
23,553	903	17	212	2,524	...	52	22	10,798	6,834	...	...	...	10
6,095	486	17	130	905	...	60	...	1,527	2,787	17	...	...	11
14,540	775	...	202	1,480	...	71	127	2,500	5,527	...	...	2,635	12
161,301	8,805	189	2,118	20,828	11	633	259	43,370	54,518	448	3,654	3,413	
10,636	662	...	200	986	...	70	...	2,805	4,126	...	...	...	1
33,545	1,315	...	330	4,607	...	293	15	5,415	14,382	...	...	2,692	2
18,673	742	13	226	3,409	...	148	38	2,193	9,137	...	...	100	3
26,140	1,234	11	342	2,733	12	184	19	4,011	10,927	...	...	...	4
22,369	1,017	5	294	1,615	...	78	3	3,613	8,298	...	...	4964	5
111,363	4,970	29	1,392	13,350	12	773	75	18,037	46,870	...	...	3,756	
15,457	483	44	165	1,167	...	1	25	4,802	4,233	117	...	...	1
10,337	528	...	87	1,438	...	26	33	2,533	3,343	97	...	...	2
12,874	439	10	109	1,609	...	32	...	1,420	3,978	398	...	...	3
18,048	690	89	242	1,192	...	...	36	3,108	5,981	78	95	...	4
14,007	630	38	200	1,964	...	...	9	3,992	5,722	...	...	...	5
15,423	701	55	290	1,032	...	49	69	2,429	5,537	...	...	...	6
86,646	3,381	236	1,093	8,402	...	108	172	18,284	28,794	690	95	...	
7,538	326	...	108	1,095	...	6	32	1,764	2,483	...	...	...	1
11,354	455	150	154	924	...	7	...	3,856	4,248	23	...	...	2
10,784	509	28	181	1,123	...	47	...	4,021	3,734	...	...	...	3
9,858	626	4	75	548	...	15	...	4,277	3,520	...	...	...	4
8,891	396	32	79	1,435	217	6	12	2,673	2,057	...	...	...	5
7,408	362	...	92	1,083	...	28	18	1,373	3,085	...	...	...	6
9,003	361	...	142	1,167	...	22	2	2,934	3,411	...	...	...	7
8,654	580	...	123	1,256	...	...	...	3,058	2,871	...	...	...	8
73,490	3,615	214	954	8,631	217	131	64	23,956	25,439	23	...	...	
22,820	1,275	155	552	3,119	...	69	483	2,199	7,349	...	...	3,011	1
23,327	1,183	251	319	1,777	...	38	122	2,015	5,633	...	...	8,144	2
17,250	871	...	439	2,407	...	61	669	2,274	7,064	70	...	2,300	3
6,996	390	...	181	1,055	...	36	153	856	2,766	...	...	...	4
9,661	640	530	356	1,215	...	10	165	1,310	3,620	...	...	...	5
18,860	801	37	435	1,109	...	95	382	1,255	5,375	1,180	...	4,330	6
11,558	426	36	121	474	...	32	170	978	2,857	...	...	6,300	7
14,771	939	96	435	3,139	...	95	304	1,259	4,411	472	...	86	8
125,053	6,525	1,105	2,838	14,295	...	436	2,448	12,146	39,075	1,722	...	24,171	

* Including \$834 bal. School Fund interest. + Funds from Township to M. L. Fund.

TABLE VI.—FINANCIAL STATEMENT—

Township municipalities.	Disbursements—Continued.							Assets.			
	School debentures redeemed.	Drainage debentures redeemed.	All other debentures redeemed.	Refund of moneys borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
WELLINGTON:											
1 Arthur		107		1,000	58	303	12,069	195	4		
2 Eramosa	200			435	13	57	10,936	303	6,444		
3 Erin						33	12,184	36	6,448		
4 Garafraxa, W.		101		1,800	28	85	12,087	233	5,468		
5 Guelph				1,565	2	72	13,119	55	6,756		14,516
6 Luther, W.		1,441		1,353	483	596	9,249	1,495	1,287	126	
7 Maryborough					30	41	13,852	5,393	1,258		
8 Minto				300	1,512	320	16,724	330	7,266	22,702	455
9 Nichol				371	4	30	8,050	203	3,228		
10 Peel			300	1,500	305	86	23,553		455		
11 Pilkington					79	6	6,014	81	3,730		
12 Puslinch				187		50	13,554	986	3,060		10,239
Totals	200	1,249	300	8,013	2,504	1,479	161,991	9,310	45,404	22,828	25,307
WATERLOO:											
1 Dumfries, N.				1,506	11	181	10,607	29	444		
2 Waterloo	400	759	1,342		859	453	32,862	683			37,382
3 Wellesley				2,457	33	158	18,674	19	2,550		\$ 12,276
4 Wilmot	336			3,700	445	144	24,098	2,042	1		
5 Woolwich	665		1,225		1,220	154	19,051	3,318	6		8,964
Totals	1,301	759	2,567	7,723	2,568	1,090	105,272	6,091	3,004		58,622
DUFFERIN:											
1 Amaranth	112	1,996		1,200	612	290	15,247	210	5,373		
2 Garafraxa, E.	186	266		1,500	173	138	10,348	489	574		
3 Luther, E.	191	695	148	2,500	424	23	11,976	898	846		
4 Melancthon	461	2,446		2,900	710	4	17,942	106	5,425	1,664	
5 Mono				1,200	24	178	13,957	50	1,064		
6 Mulmur			1,700	1,800	1,037	97	14,796	627	3,058		9,000
Totals	950	5,403	1,848	11,100	2,980	739	84,265	2,380	16,340	1,664	9,000
LINCOLN:											
1 Caistor				600	14	87	6,515	1,023	1,287		
2 Clinton	137			600	41	239	10,824	520	810		
3 Gainsboro'	399			600	60	17	10,719	65	197		
4 Grantham						122	9,187	671	3,202		
5 Grimsby, N.				1,400	44	83	8,434	457	350		
6 Grimsby, S.	192		195		269	75	6,772	636	201		
7 Louth	296				66	257	8,688	315	1,217		
8 Niagara		66		500	22	52	8,528	126	4,500		
Totals	1,024	66	195	3,700	516	932	69,677	3,813	11,764		
WENTWORTH:											
1 Ancaster				2,009	353	484	21,049	1,771	2,459		47,001
2 Barton					60	297	19,830	3,398	214		14,938
3 Beverly				672		159	17,026	224	2,945		13,691
4 Pinbrook						108	5,545	1,451	488		
5 Flamborough, E.		99			5	98	8,048	1,513	3,015		
6 Flamborough, W.	550	957		1,346	256	66	18,174	686	3,142		15,256
7 Glanford						89	11,483	75	240		8,300
8 Salfleet						424	11,600	3,111	794		6,086
Totals	550	1,656		4,018	674	1,765	112,824	12,229	13,397		105,169

* Including \$40 liability to School Fund omitted from report of 1896. † Including \$13 Tp. dep. to credit of road division. ‡ Including payment of \$300 liability omitted from Report of 1896. § Including \$676 in Tp. account.

TOWNSHIP MUNICIPALITIES.—Continued.

Assets.				Liabilities.								
School lands and buildings.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures.	Drainage debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
.....	1,000	.....	1,199	250	.....	.....	.....	637	.....	.....	.....	837
.....	.....	11	6,758	3,483	1,717	.....	.....	.....	.....	.....	90	5,290
.....	750	.....	6,484	4,227	.....	.....	.....	.....	.....	.....	.....	4,227
.....	.....	.....	6,451	3,272	1,126	.....	.....	113	.....	.....	634	5,115
.....	.....	106	21,326	3,876	.....	.....	.....	.....	.....	* 1,325	200	4,911
.....	350	113	3,014	2,301	.....	.....	600	9,189	.....	* 24	369	11,883
.....	800	.....	7,114	4,001	.....	25,000	.....	.....	.....	.....	170	4,771
.....	.....	.....	31,651	1,822	.....	.....	.....	.....	.....	.....	104	26,926
.....	.....	.....	3,431	2,453	.....	.....	.....	.....	.....	.....	181	2,634
.....	.....	38	493	.....	.....	4,979	.....	.....	.....	245	52	5,176
.....	3,000	.....	3,811	2,327	164	.....	.....	.....	.....	1,310	.....	3,801
.....	.....	.....	17,285	1,180	.....	.....	.....	.....	.....	.....	95	1,275
.....	5,900	268	109,017	28,692	3,007	29,979	600	9,939	.....	2,914	1,895	77,026
.....	.....	.....	473	.....	.....	.....	.....	.....	.....	.....	120	120
.....	1,000	.....	39,065	.....	.....	.....	4,215	7,449	6,130	.....	.....	17,794
.....	.....	730	15,575	2,305	.....	.....	.....	.....	.....	+676	.....	2,981
.....	1,380	.....	3,426	19	.....	.....	5,477	.....	.....	.....	12	5,508
.....	.....	.....	12,288	.....	.....	19,575	4,330	.....	.....	.....	1	23,906
.....	2,380	730	70,827	2,324	.....	19,575	14,022	7,449	6,130	676	133	50,309
.....	1,000	13	6,596	.....	149	8,640	588	10,345	.....	1,000	369	21,091
.....	.....	97	1,160	.....	.....	.....	1,014	1,204	.....	.....	228	2,443
.....	16	291	2,051	.....	.....	.....	3,912	5,484	1,711	.....	321	11,428
.....	1,200	.....	8,395	2,306	475	3,000	4,042	2,075	.....	2,595	304	14,797
.....	.....	.....	1,114	839	3	.....	.....	.....	.....	.....	177	1,019
.....	600	.....	13,285	3,256	.....	6,100	.....	.....	.....	.....	.....	9,356
.....	2,816	401	32,601	6,401	627	17,740	9,556	19,108	1,711	3,595	1,396	60,134
8,000	1,000	.....	11,310	1,764	.....	.....	.....	.....	.....	.....	.....	1,764
.....	200	.....	1,530	.....	.....	.....	449	.....	.....	.....	483	932
.....	.....	100	362	.....	.....	.....	222	.....	.....	.....	66	288
.....	800	50	3,873	2,516	376	.....	.....	.....	.....	.....	.....	2,892
.....	.....	18	1,657	.....	.....	.....	.....	.....	.....	.....	.....	.....
12,700	.....	.....	855	.....	.....	3,620	1,367	.....	.....	.....	56	5,043
.....	.....	.....	14,232	.....	.....	.....	1,022	.....	.....	.....	.....	1,022
.....	.....	.....	4,626	2,511	1,200	.....	.....	66	.....	.....	.....	3,777
20,700	2,000	168	38,445	6,791	1,576	3,620	3,060	66	.....	.....	605	15,718
.....	5,000	230	56,461	.....	.....	.....	.....	.....	.....	5,050	.....	5,050
.....	324	183	19,054	.....	198	.....	3,000	.....	.....	.....	1,374	4,572
10,000	3,200	1	19,961	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	400	.....	12,339	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	1,700	.....	6,258	.....	2,607	.....	.....	.....	.....	.....	161	2,768
.....	3,000	350	22,434	.....	.....	.....	550	2,444	.....	2,438	350	5,782
.....	514	.....	9,229	.....	.....	.....	.....	.....	.....	.....	238	238
.....	.....	58	10,049	.....	2,150	.....	.....	.....	.....	+86	550	2,786
10,000	14,138	822	155,755	.....	4,955	.....	3,550	2,444	.....	7,574	2,673	21,196

* Due Sinking Fund. † Due M. L. Fund. ‡ Payable to Tp. of Louth for share of School Debentures

TABLE VI. FINANCIAL STATEMENT—

Township municipalities.	Receipts.									
	Balance from 1896.	Municipal and school taxes.	Licenses.	Fees, rent, fines, &c.	Interest and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for drainage.	Borrowed on debentures for other purposes.
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
HALTON:										
1 Esquesing.....	1,747	11,222	153		1,872					30
2 Nassagaweya....	125	7,196	24	13	434	63	776			128
3 Nelson.....	2,855	10,145		50	1,343	4,176				4
4 Trafalgar.....	968	17,959	46	3	2,850	22,020	4,996			94
Totals.....	5,495	46,532	223	66	6,499	26,259	5,772			256
PERL:										
1 Albion.....	390	9,952	119				1,930			
2 Caledon.....	188	13,637	484	12	11		600			
3 Chinguacousy....	1,115	17,611	245	5	1,629	3,865				7
Toronto.....	3,918	21,305	508	5	1,036	5,846	3,000			56
5 Toronto Gore....	415	4,892	28	5	133		500			106
Totals.....	6,026	67,397	1,384	27	2,809	9,711	6,030			169
YORK:										
1 Etobicoke.....	8,162	23,205	296	15	770	1,656	269			59
2 Georgina.....	485	5,577	93							208
3 Gwillimbury, E..	1,486	10,888	153		654	400				26
4 Gwillimbury, N..	174	5,592	75				200			30
5 King.....		17,604	551	2	1,779	4,706	4,106	800		91
6 Markham.....		21,473	342							14
7 Scarborough....	1,389	14,457	389	2	624	271				109
8 Vaughan.....	6,625	19,986	597	5	2,310	2,005				59
9 Whitechurch.....	1,375	10,941	47		848	194	160			1
10 York.....	122	86,509	791	26	1,292	1,015	311	7,187		1,362
Totals.....	19,818	216,232	3,334	50	8,277	10,247	5,046	7,987		1,959
ONTARIO:										
1 Brock.....		16,891	87	56			3,000			57
2 Mara.....	397	10,261	209				2,900			178
3 Pickering.....		22,353		11	159	1,000	11,852			17
4 Rama.....	196	4,429	22		126		500			*1,032
5 Reach.....	262	12,559	166	30			6,909			24
6 Scott.....		7,365	54		133	143	544			118
7 Scugog.....	259	1,614		14			100			
8 Thorah.....	300	5,115	69	6	1,533	307	18			65
9 Uxbridge.....	242	11,182	88	37	16		1,295			7
10 Whitby, E.....	171	8,906	125	32	160		1,550			28
11 Whitby.....	512	10,481	121	6	5		1,000			34
Totals.....	2,339	111,161	941	192	2,132	1,450	29,668			1,626
DRUM:										
1 Cartwright.....	769	5,701	128	4			300			200
2 Cavan.....	88	14,735	161	15			750			26
3 Clarke.....	1,106	14,854	301	11				550		203
4 Darlington.....	2,152	17,605	139	36	37	122	400			183
5 Hope.....		10,503	79		1,584		1,059			77
6 Manvers.....	405	11,833	210	11			600			36
Totals.....	4,520	75,231	1,018	77	1,621	122	3,109	550	2,200	725

*Including \$1,000 grant for bridges from Provincial Government.

*For fire engine for Orono (Police village).]

TOWNSHIP MUNICIPALITIES.—Continued.

Total receipts.	Disbursements.												
	Allowances, salaries and commissions.	Law costs.	Other expenses of municipal government.	Roads and bridges.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	County treasurer for levies.	Payment on account of schools and education.	Drainage works.	Sinking Fund investments and deposits.	Other investments and deposits.	
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	
15,024	941		305	2,387		54	583	2,095	7,344				1
8,759	497		219	2,089			444	1,577	3,325			30	2
13,373	1,021	10	164	2,529		5	758	1,583	6,094			4,168	3
48,946	988	3	382	5,493		49	313	1,660	6,989			22,020	4
91,102	3,447	13	1,070	12,498		108	2,098	6,915	23,752			26,218	
12,391	696	14	130	2,118		24	453	2,051	4,736				1
14,932	937	41	216	1,131		43	295	2,493	8,456				2
24,477	1,089		303	3,936		17	212	5,043	7,986			3,865	3
35,674	1,440	35	307	4,184		96	458	4,080	7,368			5,804	4
6,079	410		89	839				1,198	1,898				5
93,553	4,572	90	1,045	12,208		180	1,418	14,865	30,444			9,669	
34,432	1,365	1,084	608	3,089		72	323	3,182	6,590		316	1,626	1
6,363	360	18	96	782		94	15	1,259	2,487				2
13,607	661	538	224	1,448		197	66	2,690	5,751			400	3
6,071	411		48	500		62	12	1,396	2,797				4
29,639	1,221	140	362	5,607		181	57	5,174	9,389			4,706	5
21,829	1,161	299	207	2,453	200	32	93	6,030	9,869				6
17,241	901	172	361	3,238		140	177	3,787	6,268			268	7
31,587	1,342	20	324	5,600	425	55	48	8,934	8,934			1,500	8
13,566	820	671	175	1,550		157	32	3,168	5,288			262	9
98,615	6,318	3,460	3,263	15,219		271	580	9,564	22,653		2,062	1,705	10
272,950	14,560	6,402	5,668	39,486	625	1,261	1,393	36,250	80,026		2,378	10,467	
20,091	1,079	30	362	2,690		57	451	2,997	6,365				1
13,945	913	18	229	2,399		15	147	1,151	3,840	79			2
35,397	1,278	421	636	2,840		126	977	3,298	11,518				3
6,305	439		179	1,725			79	214	1,631				4
19,950	837		442	1,993		1	818	2,546	5,978		377		5
8,357	679		262	1,458		29	338	1,605	3,416			100	6
1,937	180		59	246				280	917				7
7,413	562	19	158	1,897		103	57	757	1,840	36		23	8
12,933	860	272	298	1,587		25	293	1,148	4,117		876		9
10,972	724	3	217	1,511			259	1,953	4,258				10
12,159	815	11	187	1,296		33	306	1,914	4,207				11
149,509	8,366	774	3,029	19,644		386	3,725	17,863	48,087	115	1,253	123	
7,102	390		135	1,200		12	328	1,396	2,760				1
15,775	913	1,074	105	1,724		48	94	5,004	5,530				2
19,325	887	337	350	2,899	*2,284	136	499	3,400	7,591				3
20,674	829	716	360	3,224		25	454	4,134	7,823				4
13,302	1,002	61	305	2,461		29	361	3,296	5,521				5
13,095	775	76	210	2,030		31	510	2,080	5,967				6
89,173	4,796	2,264	1,465	13,538	2,284	281	2,246	19,310	35,192				

* Fire engine for Orono.

TABLE VI. FINANCIAL STATEMENT—

Township municipalities.	Disbursements.—Continued.							Assets.			
	School debentures redeemed.	Drainage debentures redeemed.	All other debentures redeemed.	Refund of moneys borrowed for current expenses.	Interest on loans, advances and debentures	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.
	£	£	£	£	£	£	£	£	£	£	£
HALTON:											
1 Equeusing					4	351	14,064	960	11		38,988
2 Nassagaweya				447	3	128	8,759		2,204		9,071
3 Nelson	236				45	128	16,741	1,632	240		26,546
4 Trafalgar	400			9,817	248	579	48,941	5	2,235		45,178
Totals	636			10,264	300	1,186	88,505	2,597	4,690		119,778
PEEL:											
1 Albion				1,930	64		12,216	175	2		
2 Caledon	152			600	20	121	14,505	427	1,086		
3 Chinguacousy	465				177	135	23,228	1,249	340		32,513
4 Toronto	625		304	7,500	540	186	32,927	2,747	1,904		28,357
5 Toronto Gore	435			500	123	116	5,608	471	3		3,500
Totals	1,677		304	10,530	924	558	88,484	5,069	3,335		64,370
YORK:											
1 Etobicoke	1,243		1,917	500	1,657	93	23,665	10,767	8,594	1,281	13,206
2 Georgina	290	273			137	64	5,875	488	65		
3 Gwillimbury, E.				12	102	119	12,198	1,409			12,974
4 Gwillimbury, N.	260			200	71	50	5,807	264	33		
5 King	125			2,231	54	392	29,639		1,440		39,214
6 Markham	190			344	118	123	21,119	710	2,765		
7 Scarborough	67				144	260	15,783	1,458	1,438		*13,166
8 Vaughan						354	18,602	12,985	518		35,332
9 Whitchurch					134	193	12,450	1,116	913		14,306
10 York	7,864		8,190	4,394	10,406	2,419	98,368	247	33,970	15,166	*19,791
Totals	10,039	273	10,107	7,681	12,823	4,067	243,506	29,444	49,736	16,447	147,987
ONTARIO:											
1 Brock	90	435		4,286	271	201	19,314	777	113		
2 Mara	100	1,188		2,900	261	121	13,361	584			
3 Pickering	223		2,553	10,231	969	327	35,397		4,889		1,000
4 Rama				900	319	16	5,879	426	1,504	3,697	
5 Reach		164		6,800	185	52	19,818	132	2,753		
6 Scott				281	109	80	8,357		14		4,761
7 Scuzog				100	3	6	1,791	196	212		
8 Thorah			1,000		692	272	7,413		330		53,158
9 Uxbridge	200			1,295	1,245	119	12,335	598	706	3,572	
10 Whitby, E.				1,550	34	42	10,551	421	185		3,200
11 Whitby	207		984	1,000	472	164	11,596	563	215		90
Totals	820	1,787	4,537	29,343	4,560	1,400	145,812	3,697	10,921	7,269	62,209
DURHAM:											
1 Cartwright	136			300	84	8	6,749	353	19		
2 Cavan	161			750	13	171	15,587	188	2,184		
3 Clarke	110		175		119	353	19,140	85	2,167		
4 Darlington	300			400	25	500	18,880	1,794	1,987		
5 Hope				97		169	13,302		3,161		34,368
6 Manvers	132			600	34	59	12,504	501	1,684		
Totals	839		175	2,147	275	1,350	86,162	3,011	11,202		34,368

*Omitting \$ 51 previously paid to schools but not reported.

†The above school debentures amounting to \$ 82 struck off by order of Council 1898.

TOWNSHIP MUNICIPALITIES.—Continued.

Assets.—Continued.						Liabilities.						
School lands and buildings.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures.	Drainage debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
39,000			78,959									1
10,700	1,200		23,175							329		2
23,200	1,000	1,437	54,055				516				3	3
20,200	2,075	2,233	71,921	631	137		400				217	4
93,100	4,275	3,670	228,110	631	137		916			329	220	2,233
	700		877									1
10,000	2,000		13,513								*127	2
31,500	600	840	67,042		130		2,340				3	2,473
1,500	1,500		3,008				4,540		1,360	4,500		10,400
6,800	950		11,724				1,437					1,437
49,800	5,750	840	129,164		130		8,317		1,360	4,500	130	14,437
	1,100	93	35,041		682	7,869	18,631		9,529	†1,837	2	38,550
2,600	150	364	3,667				610	1,746				2,356
	50		14,433							1,945	25	1,970
		780	1,077				780					780
			40,654				800			3,268		4,068
	200	2,212	5,887				2,191					2,191
10,850	810	188	27,909				1,809					1,809
	1,125	318	50,278	5,805	36						2,889	8,730
	280		16,614							1,593	140	1,733
	724	66,604	136,502	9,170	13,012		56,932		87,742	‡23,677	2,912	193,445
13,450	4,439	70,559	332,062	14,975	13,730	7,869	81,753	1,746	97,271	32,320	5,968	255,632
	1,100	2,043	4,033		117		1,608	871			34	2,630
	2,150		2,734				800	1,663			240	2,703
30,000	1,850	85	37,824	3,000			3,333		9,643	1,652	248	17,876
	705		6,332		493		1,700		3,000	520	100	5,813
	1,720	124	4,729	2,661						109	200	2,970
	800		5,575					785		544		1,329
3,000	1,500	9	4,917	104	109						141	354
	950		54,438			11,000				18	\$8,150	19,168
	1,000	50	5,926			19,000	1,200					20,200
	1,500		5,306		7						75	82
	735	27	1,630		30		698		7,024		93	7,845
33,000	14,010	2,338	133,444	5,765	756	30,000	9,339	3,319	19,667	2,843	9,281	80,970
	2,340		2,712				1,164					1,164
	3,000	‡3,429	8,801		12						1,263	1,275
	2,000		4,252	357			440		2,025			2,822
	450	118	4,349								100	100
	200		37,729							1,059		1,059
			2,275		1,120		418				94	1,632
	7,990	3,547	60,118	357	1,132		2,022		2,025	1,059	1,457	8,052

*Payable to Chinguacousy as Caledon's share of school debentures.

†Including \$308 due Sinking Fund.

‡Including \$5,781 due Sinking Fund.

\$ Including \$7,590 Peaverton's share of G.T.R. stock and \$350 School Debentures owing to Beaverton.

(Including \$2,400 Tip's share of Agricultural property in Millbrook.

TABLE VI.—FINANCIAL STATEMENT.—

Township municipalities.	Receipts.										
	Balance from 1896.	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Interests and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for drainage.	Borrowed on debentures for other purposes.	Miscellaneous.
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
NORTHUMBERLAND:											
1 Alnwick	262	3,054	71	21							10
2 Brighton	802	9,522		8							59
3 Cramahe	153	7,910	57	32			705				21
4 Haldimand	226	16,390	34	91			1,000				9
5 Hamilton	672	11,992	187	1		850	4,000				14
6 Monaghan, S....	53	3,366	21		30	15					
7 Murray		9,716	20	19			100	1,000			20
8 Percy	48	11,333	161	89			1,900				53
9 Seymour	2,492	13,552	9	7	18	303	1,130				396
Totals	4,708	86,835	560	268	48	1,168	8,835	1,000			587
PRINCE EDWARD:											
1 Ameliasburg	186	10,080	73	24	793	6,784	662				
2 Athol	210	3,323		10	117						
3 Hallowell	2,146	9,658		31	14		1,000				9
4 Hillier	1,687	6,368	21	3			700				50
5 Marysburg, N....	229	4,153		3	445	2,069	219				1
6 Marysburg, S....	135	4,362	11	14	394	916					
7 Sophiasburg	343	7,159	29	33	110		600				51
Totals	4,936	45,103	134	118	1,873	9,769	3,181				111
LENNOX AND ADD.:											
1 Adolphustown ...	269	2,673		1	80	50	90				
2 Amherst Island..	55	3,680	26	14			1,082				*155
3 Camden, E	1,155	15,037	267	4	1,095	1,055					21
4 Denbigh, etc.	11	1,012			1	45					169
5 Ernestown	69	15,192	32	14	1,144	4,812	215				50
6 Fredericksburg, N	805	7,705		4	35			750			2
7 Fredericksburg, S	405	5,631			31		1,363				
8 Kaladar, etc.	36	1,999	25	4							†688
9 Richmond		10,437	16	13	724	1,938	703				124
10 Sheffield	347	8,213	152	18	142	275					†135
Totals	3,152	71,579	518	72	3,252	8,175	3,453	750			1,344
FRONTENAC:											
1 Barrie	121	1,019	25	5							
2 Bedford	174	6,648	82	4							32
3 Clarendon	50	1,495					400				1
4 Hinchinbrooke ..	117	5,173	97								20
5 Howe Island	266	1,139					1				
6 Kennebec	317	2,714	26	4							15
7 King-ton	8,207	13,599	129		135						10
8 Loughborough...	144	6,776	59	5							
9 Olden	344	3,426		15							6
10 Oso		2,959	81	41							
11 Palmerston	398	2,210	33								16
12 Pittsburg	803	13,064	110	68	28		500				
13 Portland	394	7,842	114		151	500	88				65
14 Strorrington	43	8,017	8	7							
15 Wolfe Island ...	57	7,538	62				225				
Totals	11,485	83,619	826	149	314	500	1,214				165

* Sale of Township Hall and Lot.

† Including \$475 refund from ex-treasurer.

‡ Refund from

TOWNSHIP MUNICIPALITIES. *Continued.*

Disbursements.													
Total receipts.	Allowances, salaries and commissions.	Law costs.	Other expenses of municipal government.	Roads and bridges.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	County treasurer for levies.	Payment on account of schools and education.	Drainage works.	Sinking Fund investments and deposits.	Clergy Reserve and other investments and deposits.	
£	£	£	£	£	£	£	£	£	£	£	£	£	
3,418	377		78	511	23	68	9	674	1,471				1
10,391	530	74	169	1,459		70	67	2,015	4,455				2
8,878	669	1	261	1,206		17	155	1,695	4,610				3
17,750	1,092	91	494	1,577		7	456	2,653	7,476				4
17,716	893		246	2,439		79	235	2,650	6,602			500	5
3,485	263	25	72	443		34	112	962	1,442				6
10,875	639	147	216	1,219		44	78	1,794	6,145				7
13,589	558		333	2,234		31	59	1,866	5,858				8
17,907	694	204	226	1,458			404	2,093	4,667			100	9
104,009	5,715	542	2,095	12,596	23	350	1,575	16,402	42,726			600	
18,602	595	15	255	843		54	255	2,354	5,302		2,687	4,821	1
3,660	153		83	11		12	317	1,005	1,871				2
12,858	288	9	302	698		83	335	3,189	5,181				3
8,829	348	8	148	308		24	258	1,899	3,420				4
7,119	192		175	134		58	118		2,875			2,069	5
5,832	217	10	147	40		20	163	971	2,555			916	6
8,325	403		175	405		17	91	2,313	3,466				7
65,225	2,196	42	1,285	2,439		268	1,537	11,731	24,670		2,687	7,806	
3,163	207		62	227			133	1,105	1,022				1
5,012	129		41	176	703		188	1,855	1,507				2
18,634	953	22	391	1,831		53	477	2,100	7,764	25	2,768		3
1,238	111		27	112					600				4
21,528	642	27	154	1,622		21	137	7,268	6,173			4,250	5
9,301	406	345	55	524		27	69	3,530	3,016				6
7,430	288		75	922			88	2,061	2,440			31	7
2,752	216	56	65	185		18	21	207	1,489				8
13,955	546	2	74	1,456		8	354	2,836	4,692			2,416	9
9,282	397	242	192	511		1	133	2,233	2,942		1,103		10
92,295	3,895	694	1,136	7,566	703	128	1,600	23,195	31,645	25	3,871	6,697	
1,170	189		65	20					541				1
6,940	284	8	155	292			117	2,283	2,760				2
1,946	221		58	14			3	150	1,163				3
5,407	383	13	145	613			5	1,456	2,610				4
1,406	108		8	21			95	314	754				5
3,076	296	5	160	194			61	259	1,700				6
22,080	576	8	298	804			224	7,046	4,836				7
6,984	441	15	148	742			27	2,592	2,575				8
3,791	403		115	349		6	88	500	1,810				9
3,081	322	2	102	195		2	38	501	1,624				10
2,657	234		169	214				436	942				11
14,573	621		194	1,472			138	1,336	4,444	74			12
9,154	462	110	266	755		20	214	3,733	3,432				13
8,075	365		171	450			48	3,493	3,251				14
7,882	342	47	108	262	136		39	3,045	3,684				15
98,222	5,247	208	2,162	6,397	136	28	1,097	27,144	36,126	74			

TABLE VI.—FINANCIAL STATEMENT—

Township municipalities.	Disbursements—Continued.							Assets.			
	School debentures redeemed.	Drainage debentures redeemed.	All other debentures redeemed.	Re-fund of moneys borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.
	%	%	%	%	%	%	%	%	%	%	%
NORTHUMBERLAND:											
1 Alnwick						73	3,284	134	415		
2 Brighton						204	9,043	1,343	17		
3 Cramahe						264	8,878		2,558		
4 H. a. d. a. m. a. n. d.	257			3,000	95	405	17,603	147	5,131		
5 Hamilton				3,000	22	700	17,366	350	7,770		450
6 Monaghan, S.				15	90	24	3,482	3	1,226	740	
7 Murray				313	27	182	10,804	71	1,207		
8 Percy			443	1,900	133	38	13,503	86	900		
9 Seymour	91		2,150	2,716	478	297	15,578	2,329	810		
Totals	348		2,593	10,944	845	2,187	99,541	4,468	20,034	740	450
PRINCE EDWARD:											
1 Ameliasburg				273	782	118	18,354	248	332	5,412	*25,979
2 Athol						15	3,467	193	195		2,250
3 Hall's well				1,000	42	68	11,195	1,663	1,167		
4 Hillier				700	27	48	7,188	1,641	300		
5 Marysburg, N.				260	25		5,906	1,213	356		†6,899
6 Marysburg, S.				260	102		5,401	431	87		10,060
7 Sophiasburg				1,200	54	60	8,184	141	756		3,416
Totals				3,693	1,032	309	59,695	5,630	3,193	5,412	48,604
LENNOX AND ADD.:											
1 Adolphustown				90	1	13	2,860	303	29		3,000
2 Amhurst Island.				282	21	47	4,949	63	1,194		
3 Camden, E.	90				1,800	229	18,503	131	7,721	26,710	
4 Denbigh, etc.						16	866	372	1,092		
5 Ernestown	330			215	221	350	21,410	118	4,850		23,450
6 Fredericksburg, N.	100			588	143		8,803	498	1,437		3,500
7 Fredericksburg, S.				1,260	2	42	7,209	221	3,111		2,376
8 Kaladar, etc.				300	51	26	2,634	118	1,863		
9 Richmond				1,461	110	60	13,955		8,170		17,860
10 Sheffield				135	1,013	47	8,949	333	5,025	†7,349	
Totals	520			4,271	3,362	830	90,138	2,157	31,492	34,059	50,186
FRONTENAC:											
1 Barrie	144				23	28	1,010	160	1,155		76
2 Bedford	90		145		47	18	6,199	741	270		
3 Clarendon							1,609	337	882		
4 Hinchinbrooke	50				9	4	5,238	119	293		
5 Howe Island	100				6		1,406		369		
6 Kennebec						92	2,767	309	2,814		
7 Kingston						135	13,927	8,153	733		1,650
8 Loughborough			241		83	38	6,902	82	3,609		
9 Olden						66	3,337	454	995		
10 Oso	110			2	22	51	2,971	110	2,234		
11 Palmerston	200		100		125	41	2,461	196	1,086		
12 Pittsburg				467	14	8	8,768	5,805	2,391		
13 Portland						162	9,154		4,393		5,250
14 Storrington					5	99	7,882	193	3,082		
15 Wolfe Island						153	7,816	66	5,612		
Totals	694		486	469	334	895	81,497	16,725	29,918		6,976

* Decrease \$908 real estate. † Including \$907 not reported by auditors.

† Including \$159 in Tp. account.

TOWNSHIP MUNICIPALITIES.—Continued.

Assets—Continued.				Liabilities.									
School lands and buildings.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures.	Drainage debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.	
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	
2,200	860	133	3,742										1
11,500	750		13,615										2
	4,715		7,273							705		705	3
	3,150		8,428	2,709	458		376				290	3,833	4
	2,000	118	10,688	1,445						4,000	125	5,670	5
			1,969						2,000			2,000	6
	2,000		3,278				1,000					1,000	7
	8,300		9,286			754			80		6	840	8
10,000		710	13,849			4,600	93				1,873	6,566	9
23,700	21,775	961	72,128	4,154	458	5,354	1,469		2,080	4,705	2,294	20,514	
	4,800	114	36,885						15,000	662		15,662	1
	1,000		3,638										2
			2,830	2,814								2,814	3
	2,000	150	4,091	1,675								1,675	4
	1,200		9,668	1,020	68					*159		1,247	5
	850		11,428							1,586		1,586	6
	4,500		8,813		328						172	500	7
	14,350	264	77,353	5,509	396				15,000	2,407	172	23,484	
1,200	300		4,832										1
	650		1,907							800	45	845	2
	600	359	35,521	3,270	5	30,000	810					34,085	3
			1,464	155	115							270	4
	500	122	29,040	2,168	954		1,089			2,000	155	6,366	5
	450	140	6,025	533	158		1,050			1,175		2,916	6
	800		6,508	2,061	175					1,028		3,264	
	375		2,356	207	864					423	12	1,506	8
	2,300	237	25,567	2,836						3,003	2	5,841	9
	2,000	826	15,533	1,033	1,494	15,000				12,574	683	20,784	
1,200	7,975	1,684	128,753	12,263	3,765	45,000	2,949			11,003	897	75,877	
1,500	400		3,291	325	637		231				48	1,241	1
	500	200	1,711		70		501		40		58	669	2
			1,219	713	523					400	37	1,673	3
	1,000		1,412				100				152	252	4
			369	257						1	87	345	5
	600		3,723	683	1,682						229	2,594	6
	1,000	99	11,635	7,046							596	7,642	7
		75	3,766		2,649	1,402					506	4,557	8
	1,124		2,573	677	384						250	1,311	9
2,000	600	44	4,988	447	652		250					1,349	10
4,000	100		5,382	216	480		300		1,800		81	2,977	11
	2,000		10,196	5,124	146					515	153	5,938	12
	1,000		10,643	3,660						88		3,748	13
	1,000		4,275	2,375							57	2,432	14
	2,500	15	8,193	3,518	1,306					228	375	5,427	15
7,500	11,824	433	73,376	25,141	8,529	1,402	1,382		1,840	1,232	2,629	42,155	

* Due C.R. Fund.

† Including \$907 due Sinking Fund.

TABLE VI. FINANCIAL STATEMENT.

Township municipalities.	Receipts.										
	Balance from 1896.	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Interests and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for drainage.	Borrowed on debentures for other purposes.	Miscellaneous
	\$	\$	%	%	%	%	%	%	%	%	\$
LEEDS :											
1 Bastard, etc	734	10,830	79	25	861	5,073					*1,800
2 Crosby, N	293	7,570	125		169		1,000				
3 Crosby, S	355	6,201	60	2	353	362	345				6
4 Elizabethtown	485	15,426	118	1,269	176						14
5 Elmsley, S	994	2,766	32	160							8
6 Kitley	1,086	7,342	151	9							12
7 Leeds, etc., Front	147	11,918	85	74			2,500				35
8 Leeds, etc., Rear	1,046	7,135	120		69						
9 Yonge, etc., Front	853	9,848	136	1	77		600				20
10 Yonge, etc., Rear	1,681	6,217	89	22	165		264				501
Totals	7,674	85,253	995	1,552	1,870	5,435	4,709				2,456
GRENVILLE :											
1 Augusta	1,366	16,451	75	780	754	1,933					35
2 Edwardburg		14,085	15	6	756	192	4,889				50
3 Gower, S	49	3,150	5				300				
4 Oxford	649	9,660	76	27	3		1,500				31
5 Wolford	154	6,944	33								6
Totals	2,218	50,290	204	813	1,513	2,125	6,689				121
DUNDAS :											
1 Matilda		19,120		100			9,805		9,185		227
2 Mountain	2,200	11,891	456	27			3,417				
3 Williamsburg		15,188	38	1			1,677				2
4 Winchester		20,903		33			2,110		10,063		705
Totals	2,200	67,102	494	161			17,009		19,248		934
STORMONT :											
1 Cornwall	124	14,088	472	16	82		3,300	1,100			8
2 Finch	305	12,679	408	2	93		4,487		4,188		12,569
3 Osnabrock		13,142	253		2		1,500				26
4 Roxborough	39	13,179	352	11	83	3,438	1,030		5,526		295
Totals	468	53,088	1,485	29	260	3,438	10,317	1,100	9,709		2,916
GLENGARRY :											
1 Charlottenburg		14,864	287	3			7				59
2 Kenyon	1,211	10,642	224	5							126
3 Lancaster	373	11,218	126	1							274
4 Lochiel	0	10,930	420	1				230			6
Totals	1,593	47,654	1,057	10			7	230			465
PRESCOTT :											
1 Alfred	240	6,218	152	3			300				2
2 Caledonia		5,460	97				954		800		
3 Hawkesbury, E.		8,868	273								
4 Hawkesbury, W.	675	7,086	508	10			1,700		1,035		
5 Longueuil		2,284	30	4			60				
6 Plantagenet, N.	48	9,233	350	19							
7 Plantagenet, S	350	7,255	183	5			500				36
Totals	1,313	46,404	1,693	41			3,514		1,835		37

From bondsmen of late treasurer.

Including \$700 deposits on drain contracts.

TOWNSHIP MUNICIPALITIES —Continued.

Total receipts.	Disbursements.												
	Allowances, salaries and commissions.	Law costs.	Other expenses of municipal government.	Roads and bridges.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	County Treasurer for levies.	Payment on account of schools and education.	Drainage works.	Sinking Fund investments and deposits.	Clergy Reserve and other investments and deposits.	
19,402	535	142	206	438	.....	8	3	2,876	5,359	.....	380	5,050	1
9,157	355	111	130	534	.....	4	42	1,538	4,242	.....	953	.....	2
7,746	447	83	104	539	.....	1	.....	897	3,527	.....	343	396	3
17,488	878	14	337	2,875	.....	46	121	2,765	8,253	63	514	.....	4
3,950	227	115	585	.....	.....	43	.....	670	1,775	.....	.....	.....	5
8,600	582	13	189	509	70	.....	25	1,627	4,054	.....	.....	.....	6
14,759	683	35	293	3,410	.....	.....	220	1,880	5,441	122	.....	.....	7
8,370	595	2	131	842	25	4	3	1,241	4,225	.....	221	.....	8
11,535	500	28	214	649	.....	.....	30	3,075	5,026	.....	809	.....	9
8,939	282	1	94	62	.....	.....	17	741	3,871	.....	720	.....	10
109,946	5,084	429	1,813	10,443	95	106	461	17,310	45,773	185	3,940	5,446	
21,394	823	1809	474	1,830	235	23	3	2,705	7,023	.....	113	2,142	1
19,993	721	129	268	1,633	.....	22	45	2,488	6,762	196	.....	276	2
3,504	327	8	115	374	.....	.....	.....	710	1,226	120	.....	.....	3
11,946	664	348	245	365	.....	.....	49	1,979	5,001	745	55	.....	4
7,136	311	.....	83	450	.....	.....	.....	2,834	2,787	.....	.....	.....	5
63,973	2,846	1,294	1,185	4,652	235	45	97	10,716	22,799	1,061	168	2,418	
38,437	446	242	292	1,309	.....	.....	465	6,363	6,124	700	.....	.....	1
17,991	422	41	324	3,357	.....	.....	68	1,561	6,738	3,067	.....	623	2
16,906	475	129	307	1,076	1,774	16	617	2,713	6,873	874	.....	.....	3
33,814	718	106	212	2,629	.....	.....	173	3,144	7,476	728	.....	10,145	4
107,148	2,061	518	1,135	8,371	1,774	16	1,323	13,781	27,211	5,369	.....	10,768	
19,190	719	44	382	2,357	.....	122	708	1,544	8,817	82	.....	.....	1
24,746	407	4	280	1,712	.....	410	51	1,674	4,771	9,035	.....	.....	2
14,923	377	12	238	662	.....	.....	240	1,452	7,703	.....	.....	.....	3
23,953	766	342	148	1,583	.....	17	152	900	7,588	9,603	.....	.....	4
82,812	2,269	402	1,048	6,314	.....	549	1,151	5,570	28,879	18,720	.....	.....	
15,220	722	21	161	895	.....	148	167	2,897	8,734	.....	.....	.....	1
12,208	698	15	178	1,414	.....	157	93	1,456	7,416	.....	.....	.....	2
11,992	778	.....	378	848	.....	113	100	1,637	6,666	57	.....	.....	3
11,596	859	7	304	1,607	.....	49	9	1,086	7,345	91	.....	.....	4
51,016	3,057	43	1,021	4,764	.....	467	369	7,076	30,061	148	.....	.....	
6,915	483	38	118	989	.....	50	.....	1,024	3,491	349	.....	.....	1
7,311	403	320	95	1,477	.....	.....	.....	738	3,014	702	.....	.....	2
9,141	460	.....	51	732	.....	15	.....	2,025	4,744	.....	.....	.....	3
11,014	302	12	242	199	.....	44	.....	860	3,562	1,035	.....	.....	4
2,378	178	26	28	36	.....	.....	.....	432	1,385	148	.....	.....	5
9,650	442	27	172	1,100	.....	124	84	958	5,386	52	.....	.....	6
8,328	582	.....	175	1,561	.....	155	109	962	3,684	185	.....	.....	7
54,737	2,850	423	881	6,094	.....	388	193	6,999	25,266	2,471	.....	.....	

† Re Oxford mill dam.

TABLE VI. FINANCIAL STATEMENT—

Township municipalities.	Disbursements.—Continued.						Assets.				
	School debentures redeemed.	Drainage debentures redeemed.	All other debentures redeemed.	Refund of money borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
LEEDS:											
1 Bastard, etc					1,150	43	16,190	3,212	920	11,035	12,050
2 Crosby, N				300	558	54	8,821	336	1,060	6,588	
3 Crosby, S	276				267	20	6,900	846		2,141	4,051
4 Elizabethtown	100				610	64	16,640	848	5,144	5,636	
5 Elmsley, S						3	3,418	532		646	
6 Kitley						110	7,179	1,421	102		
7 Leeds, etc., Front		205		2,200	82	31	14,602	157	2,595		
8 Leeds, etc., Rear					250	59	7,598	772	164	2,303	
9 Yonge, etc., Front				600	464	118	11,513	22	299	3,525	
10 Yonge, etc., Rear	239			1,544	831	22	8,424	515	1,329	6,564	
Totals	615	205		4,644	4,212	524	101,285	8,661	12,259	37,792	16,101
GRENVILLE:											
1 Augusta				635	255	317	17,387	4,007	1,483	226	19,267
2 Edwardsburg				6,656	160	637	19,993		2,419		19,411
3 Gower, S					17	27	2,924	580	543		
4 Oxford				1,500	49	153	11,153	793	1,045	322	
5 Wolford				500	86	23	7,074	62	927		
Totals				9,291	567	1,157	58,531	5,442	6,417	548	38,678
DUNDAS:											
1 Matilda	173	1,645		19,769	802	107	38,437		3,801		
2 Mountain				350		99	16,650	1,341	2,076		623
3 Williamsburg		246		1,627	158	21	16,906		36		
4 Winchester	249	2,422	1,787	2,153	1,544	328	33,814		1,306		10,145
Totals	422	4,313	1,787	23,899	2,504	555	105,807	1,341	7,219		10,768
STORMONT:											
1 Coruwall	64			3,300	183	317	18,639	551	9,218		
2 Finch	100	666		2,655	940	700	23,405	1,341	2,800		
3 Osnabruck		293			550	1,450	12,977	1,946	1,812		
4 Roxborough		530		1,680	344	65	23,718	235	3,577		3,493
Totals	164	1,489		7,635	2,017	2,532	78,739	4,073	17,407		3,493
GLENGARRY:											
1 Charlottenburg	181		441	130	583	140	15,220		8,446		63
2 Kenyon						8	11,435	773	2,236		
3 Lancaster				1,000	60	23	11,560	432	5,034		200
4 Lochiel	75				11	152	11,595	1	10,312		
Totals	256		441	1,130	654	323	49,810	1,206	26,028		253
PRESCOTT:											
1 Alfred	118				57	145	6,862	53	4,297		
2 Caledonia		222		240	91	9	7,311		3,755		
3 Hawkesbury, E				184		5	8,216	925	1,212		
4 Hawkesbury, W	271	281	648	1,700	963		10,069	945	1,718		
5 Longueuil				145			2,378		1,149		
6 Plantagenet, N	428	50	351		237	26	9,487	163	7,109		
7 Plantagenet, S		246			49	46	7,754	574	3,909		
Totals	817	749	999	2,269	1,447	231	52,077	2,660	23,149		

* Omitting \$460 previously overstated.

TOWNSHIP MUNICIPALITIES.—Continued.

Assets.—Continued.				Liabilities.								
School lands and buildings.	Other property.	Miscellaneous.	Total assets.	County levy.	Local School rates.	Railway debentures.	School debentures.	Drainage debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
	1,500		28,717	908		23,000					190	24,098
	510		8,494			11,000						14,299
2,100	1,400		10,538			4,500	332			*3,299		5,177
	2,000	142	13,770	2,833		7,000	100	5,000		345		14,933
	500		1,678	682							120	802
	2,000		3,523									2,567
	5,260		8,012	1,953				190		306	118	5,000
			3,239			5,000						8,788
			3,846					8,788				16,413
	1,400	2,239	12,047			15,000	1,109			†264	40	92,077
2,100	14,570	2,381	93,864	6,376		65,500	1,541	13,978		4,214	468	7,969
										2,000		4,653
	3,235		28,218	2,769				3,200		889	†1,224	1,023
	4,000	1,231	27,061	2,540						300		2,847
			1,123	723								
	6,000		8,160	2,015				832				
	500		1,489									
	13,735	1,231	66,051	8,047				4,032		3,189	1,224	16,492
		568	4,369	2,500	40			20,729		130	1,955	25,354
			4,040	925						5,517		6,442
	2,099	837	2,972					1,758		77		1,835
	700	1,331	13,482	769		7,800		17,235		610	2,019	28,433
	2,799	2,736	24,863	4,194	40	7,800		39,722		6,334	3,974	62,064
	3,000		12,769	1,715	2,632		1,168			3,007	1,718	10,240
8,400	500	740	13,781	443			800	14,574		3,200	1,094	20,111
		\$5,379	9,137	1,884			1,081	14,882		1,500	421	19,768
	700	11,508	19,513	991	449			11,508			†13,762	16,710
8,400	4,200	17,627	55,200	5,033	3,081		3,049	40,964		7,707	6,995	66,829
		44	8,543		4,995		597		9,995	7	408	16,002
	1,500		4,509								642	642
			5,666	1,428	600							2,028
	70		10,383	1,572	5,393		380				914	8,229
	1,570	44	29,101	3,000	10,988		977		9,995	7	1,964	26,931
	300		4,650	1,013	2,166		826			300	938	5,243
4,000	700	641	9,096	789	1,470			1,284		1,154	550	5,247
			2,137	617	715						130	1,462
11,907	11,260	**7,332	23,162	675	386	12,052	4,342	1,266			247	18,968
			1,149	521	510					60		1,091
	2,130		9,402	1,191	2,734		1,300	203	2,588		651	8,667
	1,000	21	5,504	1,188	2,452			492		500	408	5,040
15,307	5,390	7,994	55,100	5,994	10,433	12,052	6,468	3,245	2,588	2,014	2,924	45,718

* Including \$2,581 due sinking fund.

† Including \$971 of Sch. Deb. Debt of Cardinal.

‡ Including \$3,493 drain funds.

** Vankleek Hill share of Debenture Debt.

† Due Sinking Fund.

§ Including \$3,869 due from late treasurer.

|| 63% of total value, Vankleek Hill, 37%.

TABLE VI.—FINANCIAL STATEMENT—

Township municipalities.	Receipts.										
	Balance from 1896.	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Interests and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for drainage.	Borrowed on debentures for other purposes.	Miscellaneous.
RUSSELL :	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1 Cambridge	4	9,455	228				1,100				543
2 Clarence		11,328	323	3			762				78
3 Cumberland	307	12,311	188					550			2
4 Russell	120	8,060	193	16	2		266		1,090		165
Totals	431	41,154	932	19	2		2,128	550	1,090		791
CARLETON :											
1 Fitzroy	446	8,058	52	42			600				241
2 Gloucester		18,601	391	57	27		180				357
3 Goulbourn	116	8,022	56	36	454	600	900				116
4 Gower, N	805	6,806	125	3							13
5 Huntley	265	8,096	56								
6 March	109	3,454	39		56						35
7 Marlborough	840	4,598	15								
8 Nepean		14,112	218	217	818		3,694				795
9 Osgoode	35	26,877	343	605	12	2,340	1,000			3,600	195
10 Torbolton	50	2,498					547				
Totals	2,666	101,122	1,295	960	1,367	2,940	6,921			3,600	1,752
KENFREW :											
1 Admaston	128	5,205	31	5	12		600				31
2 Algona, S		988					32				
3 Alice, etc.		3,077		2			100	300			64
4 Bagot and B	91	2,632	92	6			1,100				53
5 Bromley	808	5,235	191	6	45						15
6 Brougham	29	874	62								26
7 Brudenell, etc	278	1,815	65								
8 Grattan		3,903		1							39
9 Griffith, etc		814									4
10 Hagarty, etc		2,610	258				+650	900			214
11 Head, etc	6	1,189	71		9						
12 Horton, etc.	568	4,135									
13 McNab	2,118	7,524	127	27	25						96
14 Pembroke	306	1,698		5							81
15 Petewawa	32	1,576	35								36
16 Radcliffe & Raglan	60	1,655	61								35
17 Rolph, B & W	290	1,981	30								
18 Ross	691	5,470	292								
19 Sebastopol	76	919	15								89
20 Stafford	337	2,618									1
21 Westmeath	788	9,273	165	32			85				
22 Wilberforce, etc..	727	4,628	39								43
Totals	7,333	69,869	1,534	84	91		2,567	1,200			329
LANARK :											
1 Bathurst	438	6,867			32						17
2 Beckwith	876	6,149	60		340						114
3 Burgess, N	143	2,326									
4 Dalhousie, etc..	386	4,428	46	2							50
5 Darling	67	1,246		4	8		415				36
6 Drummond	200	7,121	65				400				5
7 Elmsley, N	551	2,829	5		9						32
8 Lanark	324	4,576	6	9							2
9 Lavant	219	1,597	214								4
10 Montague	290	9,611	8				1,241				
11 Pakenham	483	6,490	135								46
12 Ramsay	1,553	8,425	159		356						11
13 Sherbrooke, S	331	1,720	28	8							17
Totals	5,861	63,385	726	23	745		2,056				332

* Includes \$500 fire insurance.

† Including \$500, being sundry sp'l collections not paid over to Sinking Fund as per audit 1897.

TOWNSHIP MUNICIPALITIES.—Continued.

Disbursements.													
Total receipts.	Allowances, salaries and commissions.	Law costs.	Other expenses of municipal government.	Roads and bridges.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	County treasurer for levies.	Payments on account of schools and education.	Drainage works.	Sinking Fund investments and deposits.	Clergy Reserve and other investments and deposits.	
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	
11,330	611	9	310	1,779	673	102	12	1,431	5,039				
12,494	678		123	1,494		53	8	1,267	5,853				2
13,358	925	30	190	3,185		59	9	1,370	6,655				3
9,915	676	56	433	2,252	200	129	25	1,245	3,497				4
47,097	2,890	95	1,056	8,710	873	343	54	5,313	21,044	982			
9,439	523	2	160	2,575		420	10	1,023	4,080				1
19,613	1,667		380	2,348		217	55	2,392	10,458	715	82		2
10,300	589	23	131	1,171		47	10	1,001	4,536	267		500	3
7,752	503		121	649	112		98	638	3,777	296			4
8,417	702		107	688			76	2,302	2,975				5
3,693	298	36	110	372			9	372	2,239				6
5,453	490	3	118	572			25	473	2,540				7
19,854	1,204	720	495	2,432	1,268	338	66	1,500	8,552				8
35,007	844	91	654	2,496	157	45	25	1,652	14,000	492		40	9
3,095	291	10	96	429	101	17		229	1,867	28			10
122,623	7,111	885	2,372	13,732	1,638	1,084	374	11,582	55,024	1,798	82	540	
6,012	327		106	479		23		1,270	2,868				1
1,020	123		14	4		12		284	669				2
3,513	292	1	111	221	22		43	654	1,934		100		3
4,024	308	7	122	706	561		136	393	1,725				4
6,300	393	4	85	723		15		1,794	2,575				5
991	180		52	16		22		173	335				6
2,158	278		60	171		56	37	185	1,274				7
3,943	354	41	65	296		21	37	761	1,585				8
818	208	2	27	71		1	24	160	293				9
4,632	245	53	89	357		60	20	583	2,129		*500		10
1,275	258	5	10			2		181	666		55		11
4,703	343		38	495		15	12	1,398	1,803				12
9,919	611	28	184	1,431		50	133	1,514	3,905				13
2,090	214		99	317				241	633				14
1,679	229		74	107			8		891				15
1,811	223		43	65		3		199	1,269				16
2,301	221		57	19		3		359	1,366				17
6,453	327	33	146	853		20		1,214	3,062				18
1,099	142		41	40			18	173	589				19
2,956	197		71	243			11	511	1,485				20
10,343	486	26	248	1,104	15	19	15	1,790	5,547				21
5,437	289	13	98	391	87	10	11	864	2,594				22
83,507	6,248	213	1,840	8,109	685	332	505	14,692	39,097		655		
7,354	431		163	682		15	16	1,528	4,120				1
7,539	511		124	1,485		8	10	1,148	3,095				2
2,469	233		31	98		1		429	1,327				3
4,912	351		93	587		9	45	472	2,899				4
1,776	150		54	355		4	33	141	1,003				5
7,791	377		183	1,542		13		1,583	3,364				6
3,426	273		72	201		9	29	646	1,631	22			7
4,917	370		45	297		13		824	3,113				8
2,044	277	1	55	437		24		118	876				9
11,150	403	2	138	779		10	32	1,187	6,307	541			10
7,153	535	6	294	1,248		40	83	1,010	2,863				11
10,504	634		188	1,571		18	121	1,537	4,568				12
2,104	267		94	210			5	186	1,133				13
73,193	4,507	9	1,534	9,492		164	382	10,809	38,219	563			

* In Tp. account.

TABLE VI.—FINANCIAL STATEMENT—

Township municipalities.	Disbursements.—Continued.							Assets.			
	School debentures redeemed.	Drainage debentures redeemed.	All other debentures redeemed.	Refund of money borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.
RUSSELL :	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1 Cambridge	33	270	90	50	392	15	11,242	88	3,310		
2 Clarence	209	151	100	389	107	416	11,404	1,090	7,846		
3 Cumberland	100				28		12,551	807	7,634		
4 Russell	160	218	565	100	252	107	9,915		6,893		
Totals	502	639	755	539	779	538	45,112	1,985	25,683		
CARLETON :											
1 Fitzroy				200		186	9,179	260	5,899		
2 Gloucester	275	150		374	455	45	19,613		20,077	855	
3 Goulbourn				400	12	252	8,939	1,361	1,177		7,691
4 Gower, N		162		400	69	156	6,981	771	2,601		
5 Huotley	71			100	44	159	7,224	1,193	772		
6 March						3	3,439	254	1,281		400
7 Marlborough		130			28	194	4,573	880	2,492		
8 Nepean	505			2,133	264	377	19,854		15,780		9,500
9 Osgoode	106	580	6,000	3,000	786	121	31,089	3,918			15,040
10 Torbolton						27	3,095		3,119		
Totals	957	1,022	6,000	6,607	1,658	1,520	113,986	8,637	53,198	885	32,631
RENFREW :											
1 Adamston	111			600	51	92	5,927	85	2,711		
2 Alcona, S				2		12	1,020		986		
3 Alice, etc				113	28	24	3,543		647	100	
4 Bagot and B						42	4,000	24	2,037		
5 Bromley	110				16	47	5,762	538	1,000		
6 Brougham	100				30		908	83	465		
7 Brudenell, etc					30		2,691	67	2,370		
8 Grattan				409	18	37	3,624	319	498		
9 Griffith, etc						11	797	21	798		
10 Hagarty	100			48	282	152	4,618	14	3,342	500	2,000
11 Head, etc					36		1,213	62	109	350	
12 Horton, etc	110				27	5	4,246	457	1,579		
13 McNab	470				70		8,396	1,523	1,679		
14 Pembroke	80				5	250	1,839	251	667		
15 Petewawa	92			175	39	31	1,616	33			
16 Radcliffe & Rag'n							1,802	9	2,254		
17 Rolph, B & W	80				12		2,108	193	2,099		
18 Ross	100				48	33	5,836	617	320		
19 Sebastopol							1,003	96	864		
20 Stafford						15	2,533	423	699		
21 Westmeath	699				209	185	10,343				
22 Wilberforce, etc	250				14	213	4,834	603	2,072		
Totals	2,302			1,347	885	1,179	78,089	5,418	27,196	950	2,000
LANARK :											
1 Bathurst							6,955	399	665		780
2 Beckwith						2	6,383	1,156			77,942
3 Burgess, N						7	2,126	343	216		
4 Dalhousie, etc						23	4,479	433	514		
5 Darling					13	8	1,761	15	616		200
6 Deunmond		170		400	41	31	7,704	87	683		
7 Elmsley, N				300		6	3,194	232	538		
8 Lanark							4,662	255	1,203		
9 Levant					2	23	1,813	221	167		
10 Montague	100			578	79	352	10,508	642	770		
11 Pakenham	300				183	58	6,615	528	524		
12 Ramsay						50	8,440	1,814	536		7,660
13 Sherbrooke, S.						102	1,997	107	553		
Totals	400	170		1,378	618	699	68,887	6,942	6,985		16,582

* Printing \$1,400 increased in 1899 and previous years.

† Bank of Commerce (Bank of Montreal) stock at 47½ = \$6,107½ and 10 Shares Merchants' Bank stock at 17½ = \$1,750 = \$7,847. Formerly reported as per.

TOWNSHIP MUNICIPALITIES.—Continued.

Assets.—Continued.				Liabilities.								
School lands and buildings.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures.	Drainage debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
\$	\$	\$	\$	%	%	%	%	\$	\$	\$	\$	\$
850	205	4,453	783	1,596	4,805	800	439	4,094	671	2,225	517	8,729
800	348	10,084	1,596	4,805	800	326	847	847	500	8,874	7,779	8,874
400		8,841	1,679	3,434		850				1,816	205	7,779
1,500		8,393	1,140	2,272		1,445		2,100		694		7,856
3,550	553	31,771	4,415	11,294	800	3,060	7,041	671	3,419	2,538	33,238	
5,500	800	12,459	2,654	2,783						400	272	6,109
3,750		24,712	2,752	10,749		3,925	1,950			2,480	20	21,876
400		10,629	1,805					1,555		1,500	630	2,935
3,000		6,372	1,115							200	154	3,024
1,400		3,365	1,381			565					11	1,957
1,000		2,935	633									633
400		3,772	850				580			231	170	1,831
4,801	*2,552	32,633	3,479	7,679		3,575				1,694		16,427
3,300		22,258	225			213		4,975	3,600	547	217	9,013
		3,119	552	1,312								2,628
5,500	18,851	2,552	122,254	15,221	22,748		8,278	9,060	3,600	6,052	1,474	66,433
	400		3,196	1,249	997		442				90	2,778
500			1,486	167	391					32	86	676
		19	766	341			780			3		1,124
	800		2,861		62					1,124	75	1,261
1,000			2,538	594			220					814
			548	61	123		400				12	596
1,700	650		4,787	291	1,534							1,825
2,800	400	23	4,040	558								558
			819	205	420						24	649
6,500		180	12,536	553	1,866	2,000	800	1,800		1,050	512	8,581
1,100			1,621	101			600					701
3,850	1,350		7,236	423			440				103	966
	500	20	3,722	710	381		840				227	2,158
1,600	200		2,718	244	275						27	546
			33	151			528					679
			2,263	201	1,486						488	2,175
	100		2,392	230	1,215		160				229	1,834
	1,000		1,937				700					700
			960	158								158
			1,122	516	59						82	657
14,650	915		15,565				3,405			85		3,490
	181		2,856	902	607						276	1,785
32,700	7,496	242	76,002	7,655	9,416	2,000	9,815	1,800		2,294	2,231	34,711
	600		2,144									
	600		9,698									
	800		1,359		162						38	200
6,000	500		7,447									
	60		891		410					635	181	1,226
			770					380				380
	400		1,170		63					400		463
	300		1,758								258	258
			388									
	1,050		2,462				200			686		866
	1,000		2,062				3,500				114	3,614
	800		10,810		350						109	459
			660		398						103	501
6,000	6,110		41,919		1,388		3,700	380		1,721	808	7,087

* Including \$2,283 payable by Hintsburg as share of school debenture debt.

† Omitting \$4,000 overestimated in 1896 and previous returns as due Sinking Fund.

TABLE VI.—FINANCIAL STATEMENT.—

Township municipalities.	Receipts.										
	Balance from 1896.	Municipal and school taxes.	Licences.	Fees, rents, fines, etc.	Interests and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for drainage.	Borrowed on debentures for other purposes.	Miscellaneous.
VICTORIA :	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1 Bexley	139	3,440	57	28	27		500				620
2 Carden	29	2,091					235				147
3 Dalton	137	1,228									
4 Eldon		15,854	196	50	54	63	1,200				91
5 Emily	396	9,397			9	3,500	800				55
6 Fenelon		9,554	79				500	500			173
7 Laxton, etc.	123	2,664	8		101	211					50
8 Mariposa	7,013	21,553		36	93			3,100			485
9 Ops	6,920	13,812			49		400				307
10 Somerville	223	6,328	119		116	615					439
11 Verulam	1,068	9,949			16						144
Totals	16,048	95,870	459	114	465	4,389	3,635	3,600			2,511
PETERBOROUGH :											
1 Asphodel	174	7,441	9	30	103		500				
2 Belmont, etc.	23	6,924					400				602
3 Burleigh	41	1,440	26	3			400				282
4 Chandos	57	2,040					200				
5 Douro	191	6,390			25		500				
6 Dummer	437	5,446	9								56
7 Ennismore	135	3,273									
8 Galway, etc.	35	1,265									126
9 Harvey		2,791	31								3
10 Monaghan, N.		4,292	34	1			1,600				
11 Otonabee	350	15,329	21	23	17						16
12 Smith	2,639	11,871	123		30						
Totals	4,082	68,502	253	57	175		3,000				1,085
HALIBURTON :											
1 Anson, etc.	87	910	10								111
2 Cardiff	116	1,727						400			
3 Dysart, etc.	1,306	4,801	13	5	77		650				187
4 Glamorgan		1,244	21								152
5 Lutterworth		1,696									68
6 Minden	49	3,057	3								59
7 Moonmouth	35	1,943				53					136
8 Snowdon	378	2,650						4365			132
9 Stanhope, etc.	159	1,637	21								583
Totals	2,130	19,665	68	5	77	53	650	765			1,428
HASTINGS :											
1 Bangor, etc.	129	1,665	70				205				266
2 Carlow	65	2,112									384
3 Dungannon	84	1,717	63								224
4 Elzevir, etc.		3,578	52				1,283				255
5 Faraday	146	2,149	127	16				882			210
6 Hungerford		11,187	153	64			76				350
7 Huntingdon	237	7,205	48		11						271
8 Limerick	242	1,242	136								215
9 Madoc	1,231	18,538	12				2,410				1,184
10 Marmora & Lake ..	23	6,864	135	68							325
11 Mayo	33	1,947						300			229
12 Monteagle, etc.	393	2,699	74			195		950			342
13 Rawdon		15,721	103	5							453
14 Sidney		18,819	166				500				670
15 Thurlow	63	19,566	110	9							846
16 Tudor and Cashel ..	37	3,304	82								301
17 Tyendinaga	1,162	15,912	176		39						596
18 Wollaston	32	2,386	12	3							200
Totals	3,883	136,601	1,524	165	50	195	4,474	2,132			7,321

* Not reported save in debenture returns. First payment in 1898.

TOWNSHIP MUNICIPALITIES.—Continued.

Total receipts.	Allowances, salaries and commissions.	Law costs.	Other expenses of municipal government.	Roads and bridges.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	County Treasurer for levies.	Payment on account of schools and education.	Drainage works.	Sinking Fund investments and deposits.	Clergy Rates and other investments and deposits.	
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	
4,811	319	20	65	121	20	170	21	326	1,808		607		1
2,502	290		83	79			8	301	1,433	21			2
1,365	204	2	64	137		15		157	651				3
17,508	747	29	172	1,359		67	285	2,257	5,842	70	2,661		4
14,157	704	25	149	1,173		35	292	6,264	4,095				5
10,806	573		83	2,247		144	132	1,871	5,027				6
3,157	275	8	69	230			9	232	1,202		256		7
32,280	1,330	50	411	1,839	920	51	262	5,269	11,958	303			8
21,488	689	175	196	3,233	188	73	191	3,307	4,120	50			9
7,840	584	29	213	496	16	18	202	701	2,563		1,503	62	10
11,177	557	5	186	450		56	20	1,880	5,957		164		11
127,091	6,251	352	1,723	11,454	538	629	1,522	22,615	44,685	414	5,191	62	
8,257	428	49	142	1,123		8	37	2,062	2,571		201		1
7,919	444	59	170	791		9	49	683	4,263				2
2,192	199		96	169		197	7	157	451				3
2,207	287		43	157			67	120	1,345				4
7,116	460		147	919		49	78	1,959	2,542				5
5,948	416		134	841		5	315	1,214	2,443				6
3,408	227		39	370	12		15	883	1,701				7
1,426	151		54	26		45	8	121	913				8
2,825	262		86	327		69	81	497	1,170				9
5,327	330	4	47	1,153	16	12	35	1,305	1,361				10
15,756	491	5	168	2,146	40	35	239	4,725	5,382				11
14,663	533	1	112	1,782		5	379	3,655	4,204				12
77,154	4,159	118	1,223	9,740	63	434	1,290	17,353	28,754		201		
1,118	176		36	138		16	3	99	371				1
2,243	160	5	48	29				160	1,293				2
7,039	410		326	701	2,305	1	66	874	1,977				3
1,417	184		71	89		18		311	602				4
1,764	207		42	134				288	867				5
3,168	336		72	477		15	9	382	1,744				6
2,167	199	23	51	73		181	232	400	779				7
3,525	272	32	112	263		13	48	661	1,735				8
2,400	227		148	264		20	32	82	1,143				9
24,841	2,111	60	906	2,168	2,305	264	390	3,197	10,511				
2,335	389		68	171			22	147	1,480				1
2,561	234		84	224		12		128	750				2
2,088	302		45	207			12	239	994				3
5,168	423		36	485	69		56	949	2,889				4
3,530	174	66	91	235	*400	57		110	1,877			8	5
11,835	812	275	312	1,237	129		229	3,338	3,755				6
7,772	608		106	263		12	217	2,463	2,871				7
1,835	287	13	49	446			10	91	783				8
23,375	582	69	125	493		5	108	6,208	9,114				9
7,421	556		229	693		42	224	1,568	3,295				10
2,509	224		106	247			20		1,607				11
4,653	582	20	167	359			31	165	2,931				12
16,282	661	778	99	471		71	346	5,918	6,032				13
20,155	928		296	713		47	758	8,410	580				14
20,584	793	29	350	1,495			1,033	9,517	6,559				15
3,724	552	3	75	422			16	363	1,742				16
17,885	1,091	27	165	1,078		10	339	7,484	6,444				17
2,633	253		198	352		36		110	1,515				18
156,346	9,456	1,280	2,511	9,591	598	292	3,421	47,213	55,218				8

TABLE VI.—FINANCIAL STATEMENT.

Township municipalities.	Disbursements.—Continued							Assets.				
	School debentures redeemed.	Drainage debentures redeemed.	All other debentures redeemed.	Refund of moneys borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous	Total disbursements	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.	
VICTORIA :	%	%	%	%	%	%	%	%	%	%	%	%
1 Bexley		100		500	425	78	4,640	171	3,444	1,097		
2 Carden	50			235	28	21	2,479	23	704			
3 Dalton							1,232	133	347			
4 Eldon	94			1,222	751	43	15,679	1,929		3,125		
5 Emily				800	18		13,464	693				
6 Fenelon				513	11	152	10,753	53	4,828			
7 Laxton, etc					251	7	2,599	538	2,095	4,550		
8 Mariposa	460	261			401	139	23,343	8,937				
9 Ops	590	718		400	260	5	14,255	7,233	186			
10 Somerville					500	559	7,440	400	5,441	3,303	62	
11 Verulam					92	1,113	10,510	667	4,174	574		
Totals	1,194	1,079		3,670	2,737	2,117	106,294	20,797	21,219	12,649		
PETERBOROUGH :												
1 Asphodel			212	500	241	110	8,023	234	223	1,983		
2 Belmont, etc	103			650	144	392	7,759	190	2,807			
3 Burleigh	181		102	300	191	87	2,068	124	1,850			
4 Chandos					1	113	2,133	164	1,992			
5 Donro	265			500	54	68	6,961	145	772			
6 Dummer	90				48	166	5,700	248	887			
7 Ennismore						155	3,899	9	2,518			
8 Galway, etc						51	1,363	63	1,821			
9 Harvey	49			24	30	43	2,632	193	2,016			
10 Monaghan, N		37		620	18	30	4,975	352	2,350			
11 Ononabee	56				10	3	13,800	2,456	4,925			
12 Smith						22	10,693	3,970	2,081			
Totals	744	37	314	2,594	737	1,240	69,006	8,148	24,242	1,983		
HALIBURTON :												
1 Anson, etc	92				36	11	978	140	612			
2 Cardiff	30				24	606	2,235	8	2,163			
3 Dysart, etc	80				20	76	6,836	203	4,447			
4 Glamorgan	34			48	20	12	1,389	28	2,577			
5 Lutterworth				6		3	1,547	217	710			
6 Minden	34				9	64	3,142	26	3,080			
7 Monmouth						193	2,131	36	1,967			
8 Snowdon	90				25	115	3,366	159	2,750			
9 Stanhope, etc	18				19	52	2,005	395	1,692			
Totals	378			54	153	1,132	23,629	1,212	19,998			
HASTINGS :												
1 Bangor, etc					29	29	2,335		2,146			
2 Carlow	425		50	110	88	17	2,122	439	1,025			
3 Dungannon	151			18	68	25	2,061	27	2,302			
4 Elzevir, etc	100			25	18	28	5,083	85	1,831			
5 Faraday	163				69	152	3,401	129	1,922			24
6 Hungerford	761			231	205	451	11,835		9,661			
7 Huntingdon	200				65		6,805	967	3,961			
8 Lifferrick					1	41	1,721	114	1,673			
9 Madoc		330		2,901	2,407	46	22,389	986	2,233			
10 Marmora & Lake	395				193	168	7,363	58	3,672			
11 Mayo	120				33	128	2,485	24	2,065			
12 Monteagle, etc	38				24	107	4,424	229	3,722			
13 Rawdon	100			1,422	63	259	16,220	62	5,824			
14 Sidney	152			2,336	77	14	14,221	3,934	11,208			
15 Thurlow		543			21	4	20,344	240	8,020			
16 Thndor and Casbel	121				7	28	3,334	390	2,687			
17 Tyndinaga	300				13	92	17,043	842	2,573			
18 Wollaston	66				11		2,541	92	1,763			
Totals	3,092	873	50	7,043	3,392	1,689	145,727	10,618	68,288			24

* Including \$345 deficit of late treasurer owing to loss by burning of his house.

+ Including \$500 which from audit appears to be paid on sundry old accounts.

TOWNSHIP MUNICIPALITIES.—Continued.

Assets.—Continued.					Liabilities.							
School lands and buildings.	Other property.	Miscellaneous.	Total assets.	County levy	Local school rates.	Railway debentures.	School debentures.	Drainage debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
3,700	250	180	8,842	289	1,700	7,000	1,100	175			100	10,864
	30	240	997	299			750				42	1,091
			480	125	192						51	368
			5,054			13,000	1,141				100	14,241
			693									
			4,881	2,092	1,827		500				330	4,749
			7,203	452	1,450	5,000						6,902
	4,670	45	13,652	5,507			5,040	6,373			164	17,144
	1,000	4,740	13,179	3,509	41			4,552				8,102
2,750	450		12,406	565	1,799	10,000					175	12,539
	320		5,735	1,723	502		1,850				22	4,097
6,450	6,720	5,205	73,102	14,621	7,511	35,000	10,331	11,100			984	79,597
	1,700	4,620	8,760			454	3,166				1,454	5,074
		2,084	5,081	636	251		1,827			416	375	3,505
	450	1,326	3,750	73	1,129		618		1,708	836		4,864
			2,156	112	1,035					210	747	2,104
			1,317				418				149	567
	400		1,295		21		630					651
3,200	462		6,189	831	615						1,090	2,536
			1,884	337	974							1,311
			2,259	418	905		374				200	1,897
2,540	1,292		6,534	1,217				121		1,000	40	2,378
	3,550		10,931	4,404	30		113				333	4,880
			6,051	3,407							163	3,570
5,740	8,064	8,030	56,207	11,435	4,960	454	7,146	121	1,708	2,462	4,551	32,837
		514	1,266		1,069		466				4	1,539
			2,171	583	1,081		370			220	76	2,330
1,500	2,239	36	8,425	1,189	2,089		320			650	125	4,873
		88	2,693	305	553		304				56	1,218
		293	1,220	46	625							671
		*794	3,900	2,164	2,146		85				401	4,796
			2,003	532	886							1,418
		389	3,298	1,110	1,460		695				114	3,379
		92	2,179	53	744		165				198	1,160
1,500	2,239	2,206	27,155	5,982	10,653		2,405			870	974	20,844
	200		2,346	165	1,160					555	86	1,966
	80		1,544	144	814		450		250		203	1,861
		315	2,644	124	1,469		909			332	283	3,117
	800	200	2,916				200			1,283	30	1,513
	400		2,475	124	1,812		989					2,925
15,000	3,129		27,790	3,820	2,690		753			76	500	7,839
	500		5,428	1,698	2,121		700				61	4,580
		62	1,849	103	737						139	979
	650	4,390	8,259			37,200		759	300	2,410	10	40,679
	1,900		5,630	1,543	930		3,188				319	5,980
		50	2,139	160	1,054		570				285	2,069
		100	4,051	165	2,039		1,212				360	3,776
	†1,200		7,086	4,086			1,950			1,166	70	7,272
	1,000	1,248	19,390	9,496	6,101		1,248					16,845
	2,000		10,260	4,111	257			757			44	5,169
		832	3,077	197	1,618						20	1,835
			4,247		9						561	570
2,300	1,000		5,155	124	1,164		121				105	1,514
17,300	12,859	7,197	116,286	26,060	23,975	37,200	12,290	1,516	550	5,822	3,076	110,489

* Including \$734 due from other townships on union school accounts.

† Not previously reported.

TABLE VI. FINANCIAL STATEMENT—

Township municipalities.	Receipts.										
	Balance from 1898.	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Interest and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for drainage.	Borrowed on debentures for other purposes.	Miscellaneous.
	£	£	£	£	£	£	£	£	£	£	£
MUSKOKAS:											
1 Brunel	72	2,694						500			
2 Cardwell	225	1,008									34
3 Chaffey	132	2,971	26	65			1,036				144
4 Draper	376	2,485	45								52
5 McLean & Ridout	52	1,447	55	24	2						228
6 Macanlay	94	2,171	27				200				50
7 Metora & Wood	294	3,961	57								144
8 Monck	671	2,250	34	3				700			16
9 Morrison	51	1,925	38		5						2
10 Muskoka	13	1,626			2						73
11 Oakley	32	1,246									
12 Ryde	45	1,579			4						9
13 Stephenson	187	2,719	55	28			479	1,490			208
14 Watford	180	1,033	6				250				5
15 Watt	276	2,238				171		400			33
Totals	3,219	29,758	343	120	13	171	1,965	3,090			998
PARRY SOUND:											
1 Armour	621	2,473									1
2 Carling		126		5			100				3
3 Chapman	327	1,014	171								95
4 Christie	21	1,263	36	12			200				7
5 Foley	408	1,002	133	7							5
6 Hagerman	485	1,232	23				200				39
7 Himsworth, N.	341	1,725	97	6							33
8 Himsworth, S.		3,181	280	3							51
9 Humphrey	343	1,478	36								37
10 Joly	13	421					50				23
11 McDougall	555	1,794		12			300				93
12 McKellar	54	1,793	33	22				800			33
13 McMurich	410	1,566	28				100				13
14 Machar	360	1,642	24	8			100				2
15 Nipissing		967	41	3			100				214
16 Perry	404	3,265	134	18				700			
17 Ryerson	389	1,836	4								
18 Strong	158	1,840									
Totals	4,890	28,616	990	96			1,050	1,500			649
NIPISSING:											
1 Bonfield		1,971	138	14			643				
2 Caldwell	23	564	211	1			43	1,036			
3 Calvin	63	1,383					150				
4 Cameron	55	499					120				
5 Dunnet & Ratter		458	78				200				32
6 Ferris	443	1,443			5		310	300			91
7 McKim	1,214	1,948		1							
8 Mattawan	113	243					85				
9 Paineau	7	767					35				
10 Springer	34	2,956			2					3,000	376
11 Widdifield	22	1,003	28				7				10
Totals	1,974	13,235	455	16	7		1,593	1,336		3,000	509

TOWNSHIP MUNICIPALITIES.—Continued.

Disbursements.													
Total receipts.	Allowances, salaries and commissions.	Law costs.	Other expenses of municipal government.	Roads and bridges.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	County treasurer for law.	Payment on account of schools and education.	Drainage works.	Sinking Fund investments and deposits.	Cash Reserve and other investments and deposits.	
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	
2,666	264		91	343					1,811				1
1,552	186		11	110		100			563		25		2
4,374	550		130	596		41	14		1,193				3
3,153	253		24	607			6		956				4
1,798	275	36	59	221	32	142	33		640				5
2,541	275		105	691		6	5		945				6
4,456	508	61	270	892		27	63		2,127		60		7
3,674	283	38	94	356					2,152				8
2,021	241		36	220			6		1,149				9
1,714	274	4	66	371			7		948				10
758	246	4	3	35					326				11
1,157	182		68	165		30	14		453				12
5,166	292		145	906			13		3,107		279		13
1,524	341		71	527			16		150		60		14
3,118	263	6	82	377		12	5		1,406		313		15
39,677	4,438	143	1,255	6,417	32	358	187		17,926		737		
3,095	248		72	317			8		1,589				1
251	72		45										2
1,515	231	2	83	246		9			725				3
1,427	299		95	123	100	4			525				4
1,757	210		52	174	2	2	57		635				5
1,745	182		109	53		5	7		1,100				6
2,408	195		88	146					1,215				7
3,414	385		90	206		45	45		2,055				8
1,890	393	76	90	196			8		616				9
535	163		40	6	2	15			197				10
2,698	220		61	249			32		1,705				11
1,925	169		75	104					1,086				12
2,897	353		64	300		1			2,010				13
2,167	201		38	166		1	3		1,280				14
1,125	181	12	99	56		21			656				15
4,523	248	34	152	315		22	49		3,065				16
2,229	163	5	70	174	12	5			919				17
2,212	233		54	283		14			1,254				18
37,796	4,151	129	1,377	3,114	116	143	209		20,662				
2,766	289	4	132	318	15	4			1,617				1
1,878	116		175	223		3			1,341				2
1,596	191	4	68	49					862				3
674	134	28	22	10					95				4
768	154	33	80	62		20	5						5
2,592	434	40	105	100		8	30		1,034				6
3,163	271		97	359		15	8		1,296				7
441	83	2	3	1					107				8
809	228		27	25		25			504				9
6,368	376	124	155	441		16	30		1,153				10
1,070	352	9	31	212			6		431				11
22,125	2,627	244	895	1,805	15	91	79		8,440				

TABLE VI. FINANCIAL STATEMENT—

Township municipalities.	Disbursements. — <i>Continued.</i>							Assets.				
	School debentures redeemed.	Drainage debentures redeemed.	All other debentures redeemed.	Refund of money borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	Other investments and deposits.	
	£	£	£	£	£	£	£	£	£	£	£	£
MUSKOKA :												
1 Brunel						10	2,519	147	1,915			
2 Cardwell	26				28	8	1,057	495	850	225		
3 Chaffey	222			1,406	196	26	4,374		3,601			
4 Draper	150			250	34	64	2,344	814	2,366			
5 McLean & Ridout	100		50		23	12	1,623	175	1,222			
6 Macanlay				300		82	2,409	132	1,704			
7 Medora & Wood	200				105		4,318	138	4,703	60		
8 Monck	100				32	62	3,122	552	60			
9 Morrison				200	6	21	1,879	142	1,235			
10 Muskoka						40	1,710	4	1,295		50	
11 Oakley						82	696	62	661			
12 Ryde				150	9	5	1,076	81	984			
13 Stephenson				300	41	19	5,102	64	1,689	751		
14 Stisted				250	36	24	1,475	49	1,218	240		
15 Watt	100				71	1	2,636	482	775	394		
Totals	898		50	2,856	581	456	36,340	3,337	24,218	1,670	50	
PARRY SOUND :												
1 Agmour	94				6	108	2,442	653	2,590			
2 Carling				100	3		220	11	334			
3 Chapman						122	1,418	97	1,386			
4 Christie						95	1,241	186	1,543			
5 Foley				200	8	21	1,361	396	174			
6 Hagerman						28	1,484	261	990			
7 Himsworth, N.	70			200	98	36	2,048	360	762			
8 Himsworth, S.	234			4	136	104	3,304	110	2,487			
9 Humphrey	81				48	3	1,541	349	1,125			
10 Joly				50	3		476	59	1,194			
11 McDougall				300	28	6	2,601	97	1,357			
12 McKellar				300	27	36	1,797	128	1,183			
13 McMurich						67	2,799	98	2,357			
14 Machar	55			100	97	4	1,945	222	1,246			
15 Nipissing				80	13	4	1,122	3	1,623			
16 Perry	80			255	66	14	4,300	223	3,224			
17 Ryerson	96				38	4	1,486	743	2,224			
18 Strong	192				12	1	2,043	169	1,846			
Totals	902			1,589	583	653	33,628	4,165	27,645			
NIPISSING :												
1 Bonfield				373	13	2	2,766		2,651			
2 Caldwell						8	1,871	7	991			
3 Calvin				385	19	15	1,593	3	1,073			
4 Cameron			100		19		408	266	347			
5 Dunnet & Ratter				200	10	32	596	172	876			
6 Ferris			145	310	49	12	2,267	325	2,699			
7 McKim	102				61	3	2,212	951	3,346			
8 Mattawan				85	1		282	159	940		250	
9 Papineau							809		629			
10 Synger	263			3,043	299	167	6,067	361	2,337			
11 Widdifield						29	1,070		2,214			
Totals	365		245	4,396	471	268	19,941	2,184	18,108		250	

TOWNSHIP MUNICIPALITIES.—(Continued.)

Assets.—Continued.					Liabilities.							
School lands and buildings.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures	Drainage debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1,905	600		4,567		723		500					1,223
			1,570		669		374				214	1,257
			3,601				580			1,090		1,670
			3,120		1,061		350					1,411
1,400	1,040		3,837		313				250			563
	650	76	2,562		940					204	92	1,236
	*200	**600	5,701		2,576		1,550				516	4,642
			612				720					720
			1,377		876							876
			1,374		762						60	822
		25	1,123		244					150		394
400			2,065		634						150	784
1,000			3,640		713		2,140			1,820	152	3,825
	1,100	36	1,772				600					600
	265		5,351		832		1,400					2,232
3,500	200											
8,205	4,055	737	42,272		10,343		8,214		250	2,264	1,184	22,255
1,500	104	71	4,918		1,570						1,088	2,658
			345								67	67
	474		1,957		75							75
	543	25	2,297		400							400
	150	377	1,097		413						6	419
1,600	55		2,906		538						30	568
2,600	381		4,103		512		1,402				35	1,949
		9	2,606				2,019				270	2,289
1,300	661	265	3,700		562		719					1,281
			1,253		450							624
	43		1,497								300	300
	292	9	1,612		601		200				4	103
	188		2,643		735		800					393
2,650	283		4,401		1,068		1,498			104	138	1,928
	35	72	1,733		723					250	21	2,808
2,480	528	410	6,865		2,376		1,544					994
			2,967		1,417		458					21
			2,015		1,015							98
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* Not previously reported.

** Due from Port Carling on School Deb., S.S. No. 1.

† Including \$460 due Sinking Fund.

‡ School debentures, liability of Sturgeon Falls.

TABLE VI—FINANCIAL STATEMENT

Township municipalities.	Receipts.										
	Balance from 1896.	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Interests and dividends.	Refund of money invested.	Borrowed for current expense.	Borrowed on debentures for schools.	Borrowed on debentures for drainage.	Borrowed on debentures for other purposes.	Miscellaneous
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
MANITOULIN:											
1 Assinack	497	2,417	123	24							75
2 Billings	190	863	24	1							
3 Burpee	1	842					150				
4 Carnarvon	197	1,554	31		8						3
5 Cockburn Island	403	644									
6 Gordon	244	1,749	3				16				1
7 Howland	799	2,327	39								340
8 Sandfield	45	767									45
9 Tehkummah	30	981									2
Totals	2,406	12,147	220	25	8		166				468
ALICOMA:											
1 Balfour	11	1,715	158				1,825				40
2 Drury, etc.	363	1,115	155		4		99				
3 Hallam	263	1,543	345	28							
4 Hilton	69	1,533	27	11							27
5 Jocelyn	87	1,546			6						
6 Johnson, etc.	128	1,765		13							16
7 Laird	336	776		5			50	450			11
8 Macdonald, etc.	186	1,038									14
9 Nairn		515	72				300				
10 Plummer Add'l.	669	1,338	158	8							
11 Prince		163					200				
12 Rayside	25	1,646	34	36			300				
13 St. Joseph	342	3,028	48				300				98
14 Salter, May, etc.	271	2,307	182	7	2		200				
15 Sault Ste. Marie	549	*9,079	83				1,000				152
16 Thessalon	130	1,787		23							
Totals	3,429	30,894	1,262	131	12		4,274	450			358
THUNDER BAY:											
1 Needing	455	3,974			12						156
2 Oliver	563	1,742		50						2,000	
3 Shuniah	258	1,037			42		1,149				345
Totals	976	6,753		50	54		1,149			2,000	501
RAINY RIVER:											
1 Alton	43	2,036	304	18			35				18
2 Kewatin	155	3,302	458				31	5,500			
Totals	198	5,338	762	18			66	5,500			18

* Including \$2,661 lands sold and bought by Tp. for taxes.

TOWNSHIP MUNICIPALITIES.—Continued.

Disbursements.													
Total receipts.	Allowances, salaries and commissions.	Law costs.	Other expenses of municipal government.	Roads and bridges.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	County Treasurer for by-laws.	Payment on account of schools and education.	Drainage works.	Sinking Fund investments and deposits.	Emergency Reserve and other miscellaneous funds and deposits.	
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	
3,136	211		125	457		25	10		1,937				1
1,078	169	3	49	28					531				2
993	159	22	34	29					476		42		3
1,793	191		48	263			9		794				4
1,047	187		10	72					469				5
2,013	257	22	75	450			3		1,056				6
3,505	191		121	284			13		2,034				7
857	95		27	50			5		464				8
1,016	168		62	131					649				9
15,438	1,628	47	551	1,764		25	40		8,470		42		
3,749	198	5	113	157			14		784	10			1
1,736	442	24	128	331					551		4		2
2,179	274	1	48	242	68	34			1,075				3
1,667	238	9	116	185					570		20		4
1,639	145	24	74	132		3			847		34		5
1,922	202	30	78	169			5		639			50	6
1,628	136		58	131					991				7
1,238	132	10	45	267					536				8
887	339		102	18		1			345				9
2,173	173	5	29	299			63		1,029				10
363	73	15	26	5					97				11
2,041	263		39	111					818	131			12
3,816	423		17	769			44		1,577				13
2,969	341	25	73	267	200				1,422		190		14
10,863	991	36	426	2,289		2	71		2,374				15
1,940	215	4	58	199			101		1,114				16
40,810	4,455	188	1,430	5,511	263	40	298		14,769	141	257	50	
4,597	642		279	825	790		134		350		365		1
4,055	257		119	353	4		15		776			1,379	2
2,831	271	397	32	235							1,149		3
11,483	1,180	397	430	1,216	794		149		1,126		1,514	1,378	
2,454	263	50	123	325	18				1,473				1
9,446	343	65	168	240		78			8,143				2
11,900	606	115	291	565	18	78			9,616				

TABLE VI.—FINANCIAL STATEMENT—

Township municipalities.	Disbursements.—Continued.							Assets.			
	School debentures redeemed.	Drainage debentures redeemed.	All other debentures redeemed.	Refund of money borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.
	%	%	%	%	%	%	%	%	%	%	%
MANITOULIN:											
1 Assiginack	100				6	34	2,905	231	1,214		
2 Billings						43	823	255	798		
3 Burpee				100	129		991	2	1,000		42
4 Carnarvon	99				26	78	1,508	285	2,042		
5 Cockburn Island						13	751	296	1,490		
6 Gordon					32	118	2,013		1,604		
7 Howland	188				26	33	2,950	555	799		
8 Sandfield						7	648	209	850		
9 Tehkummah							1,010	6	1,005		
Totals	387			100	219	326	13,599	1,839	10,802	42	
ALGOMA:											
1 Balfour				2,183	126	126	3,716	33	1,943		
2 Drury, etc.				200	56		1,736		2,472	94	
3 Hallam	118				194	25	2,079	100	326		
4 Hilton					50	66	1,233	434	1,640	29	
5 Jocelyn					42		1,301	338	1,082	153	
6 Johnson, etc.				450	70	25	1,718	204	846		50
7 Laird				50	1	14	1,381	247	219		
8 Macdonald, etc. .						143	1,133	105	530		
9 Nairn				11			816	71	1,277		
10 Plummer Add'l. .						57	1,655	518	382		
11 Prince				100	11	5	332	71	564		
12 Rayside				400	9	265	2,036	5	830		
13 St. Joseph	48			700	40	89	3,647	169	2,369		
14 Salter, May, etc. .					105		2,613	356	2,111	298	
15 Sault Ste. Marie .				1,500	26	2,875	10,500	363	7,860		
16 Thessalon			125		11	17	1,844	96	525		
Totals	166		125	5,594	741	3,707	37,740	3,070	24,976	574	50
THUNDER BAY:											
1 Neebing				200	625	28	4,238	359	3,741	730	
2 Oliver				585	142		3,487	618	2,240		1,374
3 Shamiah					375		2,459	372	6,169	1,149	
Totals				785	1,142	28	10,134	1,349	12,150	1,879	1,373
RAINY RIVER:											
1 Alberton				100		102	2,454		1,024		
2 Keewatin	270				139		9,444		140		
Totals	270			100	139	102	11,900		1,164		

TOWNSHIP MUNICIPALITIES. -Continued.

Assets.—Continued.				Liabilities.								
School lands and buildings.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures.	Drainage debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
£	£	£	£	£	£	£	£	£	£	£	£	£
	550		1,995		900						196	1,096
			1,053		154							154
			1,044		384				2,000	150	156	2,690
			2,327		655		336				62	1,053
	47		1,833		143							143
2,000			3,604		1,175					16		1,191
2,500			3,854		202		176				35	413
			1,059		469						24	493
			1,011		250						44	294
4,500	597		17,780		4,332		512		2,000	166	517	7,527
	240		2,216		794					267	92	1,153
500			3,066				500			348		843
4,000	250		4,676				3,770				200	3,970
1,500	630	20	4,253		380		1,000				15	1,395
	803	90	2,466		64		600				142	806
1,675			2,775		200		600				73	873
380	40	24	910		191		450					641
			635									
400			1,748		305					320	18	643
	250	6	1,156		500						256	756
200	5		800		28					100	59	187
	350		1,185		716						73	789
	350		2,888		1,189		524				114	1,827
3,000	800		6,565				2,100			200		2,300
	100	+4,936	13,259		2,990						234	3,224
500	260		1,681									
12,455	4,078	5,076	50,279		7,357		9,544			1,230	1,276	19,407
600	915		6,345		158				10,500	1,100	713	12,471
500	1,100		6,131						2,000			2,000
	5,300		12,990						7,500	*1,149	914	9,563
1,400	7,315		25,466		158				20,000	2,249	1,627	24,034
700	218		1,942							185		185
8,283	550		8,973				7,500			31		7,531
8,983	768		10,915				7,500			216		7,716

* Due Sinking Fund.

† Lands held for taxes.

‡ \$2,270 of this wrongly reported as Railway Debentures in 1896.

FINANCIAL STATEMENT—

TABLE VII.—Showing the Receipts, Disbursements, Assets and Liabilities of the town

Town municipalities.	Receipts.										
	Balance from 1896.	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Water, gas and electric light rates.	Interest and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for other purposes.	Miscellaneous
	£	£	£	£	£	£	£	£	£	£	£
ESSEX :											
Amherstburg...		9,911	842	85	2,941			24,580			31
Essex 159		11,311	28	85	1,441			4,000		5,000	792
Leamington...	514	2,875	431	96	*11,041	263		60,795	1,500	29,500	2,986
Sandwich...	1,670	5,998	590	31	1,072			3,000			843
Walkerville...	4,993	24,180	307	29		30		25,467			17
Totals.....	7,336	54,275	2,198	326	16,495	293		117,842	1,500	34,500	4,669
KENT :											
Blenheim...		8,372	552					20,535		7,372	1,080
Bothwell...		5,683	305	223				500			67
Dresden...		9,371	547	368				10,723			126
Ridgetown...		14,796	770	374		85		50,398		3,300	286
Wallaceburg...	136	16,415	638	417				4,000			308
Totals....	136	54,637	2,812	1,387		85		86,156		10,672	1,867
ELGIN :											
Aylmer.....	2,408	16,106	548	267		2	1,378	4,687			254
NORFOLK :											
Simcoe.....	56	19,637	719	343		105	94	35,500		2,580	221
WELLAND :											
Niagara Falls...	5,774	44,462	1,324	210	7,302	3,209	20,000	189,180		59,083	10,691
Thorold.....	996	13,758	900	216	951			5,000			339
Welland.....	3,483	16,960	564	149	3,163	1,429				10,000	163
Totals.....	10,253	75,180	2,788	575	11,416	4,638	20,000	194,180		69,083	11,193
LAMBTON :											
Forest.....	200	8,996	275	175				6,250			326
Petrolia.....	7,309	46,055	1,933	714	2,600	398	36,465		3,500		780
Sarnia.....	145	56,644	2,950	675	11,255	1,484	451	115,947		11,510	815
Totals.....	7,654	111,695	5,158	1,564	13,855	1,882	36,916	122,197	3,500	11,510	1,921
HURON :											
Clinton.....	2,486	12,242	650	477		266					*10,588
Goderich.....	21,082	27,826	388	99	7,437	909		79,500		6,500	579
Seaforth.....	610	16,306	946	325	771	567	3,000	12,200			161
Wingham.....	719	14,181	702	305		309	2,000	10,630		4,974	356
Totals....	24,897	70,555	3,186	1,206	8,208	2,111	5,000	102,330		11,474	11,684
BRUCE :											
Kincardine...	2,983	16,182	608	172	3,712	1,073	1,266	5,768		2,490	683
Walkerton...		13,049	1,271	30	1,523	1,793	9,508	31,217		17,149	3,254
Warton.....		9,947	445	67	2,330	101		12,828			51
Totals.....	2,983	39,178	2,324	269	7,565	2,967	10,774	49,413		19,639	4,088
GREY :											
Durham.....	1,921	9,722	279	237				800			38
Meaford.....	1,825	11,814	308	409	1,006			14,876			162
Owen Sound...	22,201	62,801	923	2,432	6,215	2,155	45,988	6,953		45,988	2,014
Thornbury...	70	4,082	71	45		39		1,700			31
Totals.....	27,275	88,419	1,581	3,123	7,261	2,194	45,988	24,329		45,988	2,245

* Including \$10,016 for natural gas rates. † Including \$10,000 from Stevely estate, legacy to Memorial Library.

TOWN MUNICIPALITIES.

municipalities in the Province of Ontario, for the year ending December 31st, 1897.

Disbursements.														
Total receipts.	Allowances, salaries and commissions.	Lighting of streets, water supply and fire protection.	Law costs.	Other expenses of municipal government.	Streets, bridges and parks.	Waterworks, gas and electric light construction.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	Administration of justice, including police services.	County treasurer for levies.	Payments on account of schools and education.	Sinking Fund investments and deposits.	Other investments and deposits.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
38,890	907	1,545	267	452	3,675	1,434	85	146	219	184	488	2,225		
22,810	491	1,424	110	308	705	1,938	47	54	69	49	404	3,397		
110,001	791	2,344	149	936	1,345	*7,893	†2,702	70	272	147	808	4,628		
13,704	599	1,950	63	340	1,501	†144		45	324	278	372	1,972		
55,023	1,196	2,813		781	3,082			200	53	1,898		4,179		
239,434	3,895	10,076	589	2,821	10,311	11,409	2,834	515	937	2,556	2,072	16,401		
37,911	819	1,374	403	801	378	**113	\$3,721	100	107	260	936	2,873		
6,783	727	138		211	1,007		39	1	82	50	552	1,419		
21,135	192	1,167		260	961			1	464	972	806	3,182		
70,000	469	2,092	108	356	1,075		125	36	132	365	1,011	4,311		2,003
21,914	1,102	2,309	226	571	2,563			207	226	592	954	5,047		
157,752	3,309	7,080	737	2,199	5,934	113	3,885	345	1,011	2,245	4,259	16,832		2,003
25,650	954	3,371	285	634	3,109	149		69	238	250	758	5,358		
59,234	651	3,054	165	477	4,457			59	332	637	1,419	5,777	742	
341,235	4,338	9,769		2,014	6,791	176,769	100	27	1,044	1,319		11,841		20,972
22,167	638	2,187	232	449	1,596	2,606		42	144	598		4,421		
35,911	1,033	2,339	333	836	1,263	a2,557	1,063	10	100		994	4,809	2,106	
399,306	6,039	14,295	565	3,299	9,650	81,932	1,163	79	1,288	1,917	994	21,071	2,106	20,972
16,222	343	877	10	411	1,119		400	28	32	284	347	3,350		
99,754	3,275	6,188	398	1,331	3,413	b46,317		91	729	1,777	1,282	16,100		190
201,876	3,066	14,361	118	1,832	5,851	**981	50	200	1,010	3,337	2,063	14,229	1,399	8,846
317,852	6,684	21,426	526	3,577	10,383	47,298	450	319	1,771	5,898	3,692	33,679	1,399	9,036
26,709	430	1,637		652	1,907		437	30	41	489	677	4,800	835	
144,880	2,761	7,571	19	785	2,210	c27,706		190	316	425	1,313	8,205	2,697	
34,886	1,467	2,602	9	408	1,932			15	54	285	769	4,950	2,107	
34,176	693	1,257	27	330	6,122		303	1	135	453	975	3,290	1,325	
240,651	5,291	13,067	55	2,175	12,221	27,706	740	235	546	1,652	3,734	21,245	6,964	
34,537	479	3,959	77	848	1,564	92	344		363	330	808	5,218	3,142	
78,891	661	2,015	262	1,183	922	**1,943	6,108	66	457	343	887	5,114	4,719	6,225
25,769	567	3,031	135	360	1,449			227	111	67	423	3,300		
139,200	1,707	9,055	474	2,391	3,935	2,035	6,679	177	887	1,096	2,023	13,632	7,861	6,225
12,907	538	364	8	198	267				118	31	609	2,074		
30,400	1,387	1,479	15	304	719		301	51	85	161	836	3,360		
198,338	4,268	4,552	117	1,380	6,356	d8,123	2,425	180	1,116	3,239	2,944	15,694	52,764	
6,668	381	244	28	230	913				13	56	287	1,308	114	
248,403	6,574	6,639	168	2,116	8,253	8,123	2,726	231	1,332	3,487	4,676	22,436	52,878	

* Including \$379 for sewers. † Maintenance and operation of natural gas works. ‡ Including \$123 for sewers. ** Sewers. § Town hall. ¶ Including \$74,169 for sewers. a \$36 for sewers. b Including \$178 for sewers. c Including \$17,471 for sewers. d Including \$1,726 for sewers.

FINANCIAL STATEMENT—

TABLE VII.—Showing the Receipts, Disbursements, Assets and Liabilities of the

Town Municipalities.	Disbursements. —Continued						Assets.			
	School debentures redeemed.	All other debentures redeemed.	Refund of moneys borrowed for current expenses.	Interest on loans advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments ^a and deposits.	All other investments and deposits.
	£	£	£	£	£	£	£	£	£	£
ESSEX :										
Amherstburg		1,577	21,239	3,674	145	38,261	129	9,091		
Essex	528	2,804	6,500	3,156	507	22,401	415	5,549		
Leamington	957	2,445	78,150	5,256	1,105	110,001		7,683		
Sandwich	124	779	3,000	1,499	41	13,034	170	7,020		
Walkerville	667	6,924	26,411	3,642	3,174	55,023		433		
Totals	2,276	14,529	135,300	17,227	4,972	238,720	714	29,776		
KENT :										
Blenheim		1,664	22,624	1,604	134	37,911		7,106		
Bothwell	300		1,795	129	67	6,523	260	1,996		
Dresden		2,117	9,823	1,148	42	21,135		4,387		
Ridgetown	321	1,844	52,630	3,417	214	70,009		8,345		2,082
Wallaceburg	808	3,396		3,052	523	21,576	338	14,818		
Totals	1,429	8,521	86,872	9,350	980	157,154	598	36,652		2,082
ELGIN :										
Aylmer	891	3,205	3,000	2,203	1,176	25,650		3,157		
NORFOLK :										
Simcoe	302	3,422	31,269	4,822	1,171	58,786	468	521	4,507	
WELLAND :										
Niagara Falls	1,942	5,623	182,540	9,848	5,850	340,817	418	11,829		20,972
Thorold		818	5,000	1,449	1,202	21,382	778	4,740		
Welland		784	9,000	4,237	152	31,616	4,295	3,958	32,869	
Totals	1,942	7,225	196,540	15,534	7,204	393,815	5,491	20,527	32,869	20,972
LAMBTON :										
Forest		985	5,850	284	571	14,891	1,331	852		
Petrolia	1,045	6,304		6,453	584	95,480	4,274	34,403		190
Sarnia	2,225	13,553	114,073	13,947	634	201,775	101	31,731	5,923	39,358
Totals	3,270	20,842	119,923	20,684	1,789	312,146	5,706	66,986	5,923	39,548
HURON :										
Clinton				1,549	726	14,210	\$12,499	3,638	4,311	
Goderich		754	79,500	8,240	1,166	143,858	1,022	5,701	17,178	250
Seaford		3,000	13,200	2,893	979	34,660	226	968	20,617	7,400
Wingham		1,500	9,756	4,189	1,223	31,579	2,597	972	5,139	14,250
Totals		5,254	102,456	16,871	4,094	224,307	16,344	11,279	47,245	21,900
BRUCE :										
Kincardine		1,064	7,491	4,514	348	30,641	3,896	4,661	19,664	
Warkenton		6,726	31,450	5,950	1,040	76,071	2,823	8,875	10,662	27,001
Wiaarton j.	159	725	10,474	2,866	1,497	25,769		1,559		8,000
Totals	159	8,515	49,415	13,330	2,885	132,481	6,719	15,095	30,326	35,001
GREY :										
Durham	272	1,493	800	1,592	60	8,424	4,573	133	436	a
Meaford	1,007	1,133	15,576	2,074	141	28,633	1,767	1,103		
Owen Sound	649	894	12,222	21,600	640,406	178,929	19,409	37,173	47,625	15,000
Thornbury		254	1,700	348	118	5,994	674	419	778	
Totals	1,928	3,774	30,298	25,614	40,725	221,980	26,423	38,828	48,840	15,000

* Including \$4,411 on acc. of local impt. and Police Station and Armory. † Paid County \$2,325 and watchman G.T.R. \$167. ‡ Including \$3,210 deficit of J. Packham, and \$1,628 paid to County. § Including \$9,564 of Stevely Memorial Library grant unexpended. ¶ Including \$20,776 balance Consolidated Debentures held to meet maturing debentures and interest. * Omitting \$100 decline in value of town docks. a Omitting \$93 balance from previous returns, written off. b Including \$40,000 to C. P. R. c Including \$2,793 Water works' balance.

TOWN MUNICIPALITIES.

town municipalities in the Province of Ontario, for the year ending December 31st, 1897.

Assets--Continued.						Liabilities.						
School lands and buildings.	Waterworks, gas, and electric light plant.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢
6,000	43,500	15,600	217	74,537	488	1,882	4,584	.....	58,633	9,980	631	76,198
16,000	31,992	6,130	920	61,006	404	2,600	.....	5,688	43,702	5,500	645	58,539
19,000	50,000	4,300	19,201	100,184	.....	3,324	7,114	15,717	67,241	13,845	1,339	108,580
6,000	19,000	4,706	4,690	41,586	388	2,013	.....	1,436	21,396	3,016	392	28,641
14,800	.....	5,807	40,870	61,910	.....	.....	.....	2,666	40,870	3,467	680	47,683
61,800	144,492	36,543	65,898	339,223	1,280	9,819	11,698	25,507	231,842	35,808	3,687	319,641
6,200	.....	19,715	415	33,436	794	.....	7,684	.....	16,942	6,861	208	32,489
6,000	.....	7,550	*6,135	21,941	.....	1,538	.....	400	.....	670	114	2,722
7,500	.....	+35,950	.....	47,837	.....	.....	7,308	.....	8,534	7,323	.....	23,165
26,800	.....	13,640	+13,405	64,272	863	.....	11,460	3,989	53,313	3,898	.....	73,523
20,000	.....	16,150	45	51,351	908	5,762	2,716	9,652	33,447	11,300	.....	63,785
66,500	.....	93,005	20,000	218,837	2,565	7,300	29,168	14,041	112,236	30,052	322	195,684
31,850	17,000	14,100	1,229	67,336	.....	.....	.....	8,950	22,382	1,687	425	33,444
32,500	.....	24,980	.....	62,976	.....	.....	10,000	20,686	44,468	11,430	204	86,788
59,500	118,150	55,850	\$112,942	379,661	.....	555	.....	33,475	191,698	12,640	113	238,481
20,700	12,000	19,000	.....	57,218	957	2,528	.....	.....	15,145	.....	1,121	19,751
18,700	55,927	a14,686	3,189	133,624	904	2,300	.....	.....	85,655	.....	.....	88,859
98,900	186,077	89,536	116,131	570,503	1,861	5,383	.....	33,475	292,498	12,640	1,234	347,091
18,200	.....	13,800	.....	34,183	.....	.....	.....	7,146	3,344	900	357	11,747
25,000	167,776	48,500	9,988	290,131	1,091	13,100	.....	9,424	224,319	.....	26,535	274,469
74,500	95,500	44,000	24,157	315,270	.....	.....	8,480	38,528	198,660	7,981	5,658	259,307
117,700	263,276	106,300	34,145	639,584	1,091	13,100	8,480	55,098	426,323	8,881	32,550	545,523
17,000	.....	19,000	.....	56,448	813	1,500	.....	2,000	27,500	.....	11	31,824
25,600	102,369	30,563	b21,957	204,640	.....	.....	.....	5,000	141,439	17,500	263	164,202
21,000	13,000	17,800	.....	81,011	.....	.....	.....	11,500	38,500	c3,100	.....	53,100
10,500	9,400	19,500	5,590	67,948	.....	.....	8,000	.....	59,974	6,130	2,125	76,229
74,100	124,769	86,863	27,547	410,047	813	1,500	8,000	18,500	267,413	26,730	2,399	325,355
25,000	55,266	d35,800	.....	144,287	.....	4,429	.....	.....	85,485	e2,825	.....	92,739
25,500	35,000	28,500	536	138,897	.....	.....	.....	12,600	f91,945	13,794	6,734	125,073
16,000	28,200	2,050	1,793	57,602	395	.....	5,000	11,841	31,462	5,828	5,649	60,175
66,500	118,466	66,350	2,329	340,786	395	4,429	5,000	24,441	208,892	22,447	12,383	277,987
5,000	.....	7,000	.....	17,142	.....	1,584	18,000	790	6,489	.....	153	27,016
22,500	20,000	g26,500	232	72,102	.....	.....	.....	11,448	22,079	2,800	817	37,144
57,400	111,101	92,535	3,280	383,524	.....	16,103	130,000	33,244	322,034	4,953	1,045	507,379
5,000	.....	.....	.....	6,871	.....	1,450	.....	.....	5,859	.....	88	7,397
89,900	131,101	126,035	3,512	479,639	.....	19,137	148,000	45,482	356,461	7,753	2,103	578,936

* Including sidewalks \$1,500, drains \$1,600. + Including \$18,000 for bridge formerly in "other assets."
† Silica Barytic walks. § Including \$106,730 for new sewers, and \$3,210 deficit of J. Packham. a \$6,000
iron bridge. b Including \$18,396 for sewers. c Due Sinking Fund. d Including \$15,000 for three iron
bridges. e Including \$20,776 balance of consolidated debentures. f Including \$7,794 due Sinking Fund.
g Including wharf, \$1,000.

FINANCIAL STATEMENT

Town municipalities.	Receipts.										
	Balance from 1896.	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Water, gas and electric light rate.	Interest and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for other purposes.	Miscellaneous.
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
SIMCOE:											
Alliston	1,873	9,391	293	59	246	141					667
Barrie	4	43,662	2,625	652		546		8,953			168
Collingwood ...	998	37,262	1,726	1,812	8,459	73		*50,199		37,000	2,778
Midland	3,980	10,315	734	33				18,200			52
Orillia	15,330	30,913	1,510	807	11,630	155		14,000	3,000	6,100	1,075
Penetanguishene	1,610	8,696	844	25	1,092	20		1,350	†1,600		6
Stayner	1,485	4,023	444	58				800			48
Totals	25,360	144,292	8,156	3,446	22,227	935		93,502	4,600	43,100	4,784
MIDDLESEX:											
Parkhill		8,610	481	166		110		4,500			22
Strathroy	999	19,949	999	686				46,200			283
Totals	999	28,589	1,480	852		110		50,700			305
OXFORD:											
Ingersoll		34,975	1,676	1,726		3,918	\$83,131	26,948	5,144	30,000	1,031
Tilsonburg	8,457	14,639	876	209		560	6,127			\$23,000	1,278
Woodstock	16,208	64,042	2,897	3,117	16,112	6,272	34,324	35,647		26,678	47
Totals	24,665	113,676	5,379	5,052	16,112	10,750	123,582	62,595	5,144	79,678	2,356
BRANT:											
Paris	1,092	18,755	509	321	5,743	376		4,000			255
PERTH:											
Listowel		19,052	949	176		83		2,551			340
Mitchell	99	13,772	680	284	2,290			31,827		15,000	584
St. Marys		21,294	929	207				20,260			916
Totals	99	56,098	2,558	667	2,290	83		54,578		15,000	1,840
WELLINGTON:											
Harri-ton	965	9,421	664	280		224		6,800		1,272	686
Mount Forest ...	112	14,337	1,034	275		535	400	24,200		4,915	321
Palmerston	968	10,867	524	111				4,700			350
Totals	2,045	34,625	2,222	666		759	400	35,700		6,187	1,357
WATERLOO:											
Berlin		52,092	2,129	1,569		145		11,109	5,000	13,850	1,917
Galt		52,895	2,595	1,577	7,194	2,835	500	20,517		9,221	3,875
Waterloo		19,721	802	328		129	2,344	14,277		14,468	1,373
Totals		124,708	5,526	3,474	7,194	3,109	2,844	45,903	5,000	37,539	7,165
DUFFERIN:											
Orangeville	137	21,889	1,054	536	1,052	713	2,500	13,567			236
LINCOLN:											
Niagara	1,117	9,488	289	559	4,254			1,588			38
WESTWORTH:											
Dundas	4,507	19,155	549	303	1,120	563		1,240			426

* Including \$29,899 for local improvements and renewals. † Issued in 1896 but not returned in Report of 1896. ‡ Including \$2,200 rebate on Industrial mtg. § Including \$10,000 Ry. Bonus (T.L.E. & Pac.

TOWN MUNICIPALITIES.—Continued.

Disbursements.														
Total receipts.	Allowances, salaries and commissions.	Lighting of streets, water supply and fire protection.	Law costs.	Other expenses of municipal government.	Streets, bridges and parks.	Waterworks, gas and electric light construction.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	Administration of justice, including police services.	County treasurer for levies.	Payment on account of schools and education.	Sinking Fund investments and deposits.	Other investments and deposits.
£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
12,670	743	732	237	285	208			25	11	10	1,581	1,589	1,122	1,509
56,600	1,625	6,642	676	1,318	7,450	*364		112	615	1,167	2,389	14,204	60	
140,307	3,010	9,151	55	1,485	10,959	1,379	1,133	40	918	452	3,022	9,908	1,324	
83,314	796	1,626	194	382	1,337		434	80	268	8		3,686		
84,506	2,484	8,805	450	949	4,418	1,118	\$12,071	88	401	889	1,242	15,475		
16,173	685	1,151	6	431	1,062	172	169	54	142	425	414	4,943	20	
6,838	728	546		119	343			13	10	32	338	1,450		
350,402	10,071	28,653	1,618	4,969	25,777	3,033	13,820	409	2,404	2,983	8,986	51,255	2,526	1,500
13,919	249	722	55	404	566	*305	24	108	27	77	452	2,976	546	
69,116	1,433	2,081	100	401	1,904	*41		550	96	480	1,207	6,453		
83,035	1,682	2,803	155	805	2,470	346	24	658	123	557	1,659	9,429	546	
188,549	1,602	6,326	1,566	945	14,907			286	403	1,957	2,237	10,670	54,035	
55,096	664	1,326		569	532		8,285	50	124	424	1,155	4,607	9,346	
205,344	2,643	19,227	581	2,030	6,963	13,444	700	310	911	2,908	4,382	16,708	152,012	143
448,989	4,909	26,879	2,147	3,544	22,402	3,444	8,985	646	1,438	5,289	7,774	31,985	115,393	143
31,051	1,066	6,811	50	952	2,547	338		99	681	717	1,199	6,460	750	
23,151	789	2,078	473	551	8,161				64		1,138	4,270	306	
64,516	809	3,049	1,393	405	1,847				65	609	852	3,630		
45,546	665	2,686	32	751	3,656			132	327	1,545		6,175		
133,213	2,063	7,813	1,898	1,707	13,664			132	456	2,154	1,990	14,075	306	
20,312	731	1,326		306	1,254		41	3	3	22	806	3,473	1,272	
46,129	515	1,440	27	496	6,113	1,705			178	362	1,107	4,554	1,729	
17,520	548	874	65	205	914				3	308	780	3,146	196	
83,961	1,794	3,640	92	1,007	8,281	1,705	41	3	184	692	2,693	11,173	3,197	
87,811	2,613	8,995		1,939	6,151	*8,054	231	983	1,451	650	3,970	19,249		
101,209	4,406	7,740	1,566	1,864	23,952	1,385	2,298	524	1,640	892	3,899	14,350	8,522	
53,442	1,522	3,261	57	847	9,559	*4,060		25	656	360	1,774	5,279	118	
242,462	8,541	19,996	1,623	4,650	39,662	13,499	2,529	1,532	3,747	1,902	9,643	38,878	8,640	
44,684	892	2,597	54	599	1,212	917		20	113	392	2,686	4,821	3,901	
17,333	978	3,003	410	1,186	1,456	284		106		433	1,000	2,404		
27,863	1,348	2,112	409	1,017	3,605	4,825	233	100	728	892	817	5,508	1,253	

* Sewers. † Including local improvements. ‡ Harbor improvement. § \$10,000 for park; \$1,858, fire hall; \$213, Govt. shed.
¶ Including \$2,493 for sewers. * Including \$3,649 in Town account. a Waterworks balance.

FINANCIAL STATEMENT—

Town municipalities.	Disbursements.—Continued.						Assets.			
	School debentures redeemed.	All other debentures redeemed.	Refund of moneys borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investment and deposits.	All other investments and deposits.
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
SIMCOE :										
Alliston	605	6	.....	2,442	123	11,219	1,451	2,381	4,460	1,500
Barrie	283	3,425	9,654	5,657	959	56,600	.....	8,861	1,661	.....
Collingwood	705	6,929	57,835	12,136	15,077	135,518	4,789	608	3,757	.....
Midland	290	990	20,700	1,289	275	32,355	959	4,337	.....	.....
Orillia	390	9,095	14,000	7,933	565	80,378	4,122	10,117	.....	.....
Penetanguishene	54	1,090	.....	3,137	965	14,920	1,253	8,065	588	1,500
Stayner .....	.....	200	800	59	219	4,906	1,932	517	.....	.....
Totals	2,327	21,735	102,989	32,658	18,183	335,896	14,506	34,886	10,466	3,000
MIDDLESEX :										
Parkhill .....	.....	400	5,581	1,024	396	13,912	7	1,633	3,377	.....
Strathroy .....	.....	3,341	47,200	2,792	410	68,489	627	2,469	.....	*16,281
Totals .....	.....	3,741	52,781	3,816	806	82,401	634	4,092	3,377	16,281
OXFORD :										
Ingersoll .....	.....	60,000	20,655	9,803	3,157	188,549	.....	10,386	25,293	14,836
Tilsonburg .....	.....	6,072	.....	4,234	10,087	47,475	7,621	1,074	14,269	.....
Woodstock .....	.....	25,134	32,000	20,696	1,011	191,803	13,541	11,847	148,295	11,486
Totals .....	.....	91,206	52,655	34,733	14,255	427,827	21,162	23,307	187,857	26,322
BRANT :										
Paris .....	.....	711	4,000	1,434	689	28,504	2,547	516	8,500	.....
PERTH :										
Listowel .....	.....	.....	.....	4,708	613	23,151	.....	1,628	306	.....
Mitchell .....	.....	15,772	32,027	3,304	516	64,078	438	97	.....	.....
St. Marys .....	.....	2,047	23,550	2,211	1,273	45,050	496	2,513	.....	.....
Totals .....	.....	17,819	55,577	10,223	2,402	132,279	934	4,238	306	.....
WELLINGTON :										
Harriston .....	.....	49	7,550	1,946	380	19,162	1,150	4,291	5,088	.....
Mount Forest .....	.....	400	23,200	3,529	168	45,523	606	200	10,344	.....
Palmerston .....	.....	663	4,200	3,836	214	15,952	1,568	2,863	802	.....
Totals .....	.....	1,112	34,950	9,311	762	80,637	3,324	7,354	16,234	.....
WATERLOO :										
Berlin .....	.....	7,885	15,246	7,519	2,875	87,811	.....	2,606	.....	5,000
Galt .....	.....	.....	13,797	12,283	2,068	101,186	23	4,169	68,771	.....
Waterloo	348	1,636	19,742	2,923	1,275	53,442	.....	207	637	1,054
Totals	348	9,521	48,785	22,725	6,218	242,439	23	6,982	69,408	6,054
DUFFERIN :										
Orangeville	127	1,135	17,718	5,987	270	43,441	1,243	4,664	8,353	.....
LINCOLN :										
Niagara .....	.....	2,470	.....	3,031	174	16,935	398	3,620	.....	.....
WENTWORTH :										
Dundas	600	290	.....	2,826	1,250	27,863	.....	15,191	14,598	.....

* \$979 written off in 1897.
of Park Com.

† Including \$10,000 bonus to T.L.E. & Pacific Ry.

‡ Balance to credit

TOWN MUNICIPALITIES.—Continued.

Assets.—Continued.							Liabilities.					
School lands and buildings.	Waterworks and electric light plant.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates	Railway debentures.	School debentures	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢
6,300	19,341	8,802	2,399	46,634	.....	879	.....	3,115	51,223	.....	.....	55,217
48,000	.....	46,900	2,870	108,292	2,330	100	.....	17,546	80,167	8,953	3,178	112,274
33,200	106,203	90,700	506	239,763	.....	.....	.....	6,523	219,353	*8,600	554	235,080
10,000	.....	10,600	.....	25,896	.....	404	.....	4,332	12,458	3,000	.....	20,194
77,500	102,800	21,588	3,290	219,417	1,244	8,760	.....	10,710	136,944	.....	500	158,158
11,000	36,000	12,775	.....	71,181	.....	.....	.....	1,546	151,930	4,357	7,786	65,619
6,000	.....	2,975	.....	11,424	339	1,350	.....	.....	500	.....	200	2,389
192,000	264,344	194,340	9,065	722,607	4,317	11,089	.....	43,772	552,575	24,910	12,218	648,881
13,500	.....	11,200	10	29,727	447	30	.....	8,000	7,400	.....	138	16,015
24,000	.....	13,000	.....	56,367	1,195	.....	.....	.....	41,226	3,000	.....	45,421
37,500	... ..	24,200	10	86,094	1,642	30	...	8,000	48,626	3,000	138	61,436
42,200	.....	29,270	43,641	165,626	.....	.....	.....	5,144	125,680	†26,948	199	157,971
23,500	33,500	22,150	.....	102,114	.....	.....	13,000	15,500	65,964	.....	.....	94,464
47,545	162,392	59,820	5,230	460,156	.....	5,290	.....	60,525	402,043	\$23,059	70	490,987
113,245	195,892	111,240	48,871	727,896	.....	5,290	13,000	81,169	593,687	50,007	269	743,422
17,000	50,000	54,000	...	132,563	...	.....	.....	.....	45,338	.....	.....	45,338
23,000	5,600	9,800	.....	40,334	.....	.....	.....	6,000	83,000	5,552	.....	94,552
12,000	24,000	13,000	440	49,975	852	100	.....	.....	35,327	1,000	60	37,339
21,500	2,050	36,400	.....	62,959	.....	.....	.....	.....	50,402	.....	882	51,284
56,500	31,650	59,200	440	153,268	852	100	.....	6,000	168,729	6,552	942	183,175
12,000	.....	13,300	.....	35,829	806	.....	20,000	3,000	10,346	3,450	640	38,242
24,000	1,705	9,000	.....	45,855	.....	.....	15,000	7,750	44,315	2,000	464	69,529
13,015	.....	7,528	.....	25,776	.....	.....	30,000	10,000	24,067	3,000	.....	67,067
49,015	1,705	29,828	.....	107,460	806	.....	65,000	20,750	78,728	8,450	1,104	174,838
41,500	||960	58,365	103,597	212,028	.....	.....	.....	5,000	138,576	11,109	.....	154,685
75,000	170,000	64,010	18,905	400,878	.....	.....	.....	11,000	235,721	20,517	4,045	271,283
15,000	.....	31,000	α22,421	70,319	.....	4,600	.....	2,571	54,356	4,277	3,394	69,198
131,500	170,960	153,375	144,923	683,225	.....	4,600	.....	18,571	428,653	35,903	7,439	495,166
17,975	47,329	18,200	225	97,989	.....	3,800	29,500	3,023	80,079	6778	933	118,113
5,000	52,089	18,050	2,950	82,107	743	.....	.....	.....	47,798	6,580	444	55,565
18,600	46,476	14,921	α5,867	115,653	.....	.....	.....	4,800	56,202	1,240	.....	62,242

* From bank, pending issue of debentures for local improvements. †Omitting \$5,323 being Ry. award, payable to Tiny Tp. which issued the debentures. The liability is transferred to "Miscellaneous."

‡ Including \$1,772 due Sinking Fund. § Due Sinking Fund. | Gas. α Cement walks.

δ Including \$711 due Sinking Fund. c Including \$4,110, value of dam.

TABLE VII.—FINANCIAL STATEMENT—

Town municipalities.	Receipts.										
	Balance from 1896	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Water, gas and electric light rates.	Interest and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for other purposes.	Miscellaneous.
HALTON :	%	%	%	%	%	%	\$	\$	\$	\$	\$
Milton	3	7,824	183	281	863	175	1,587			1,706	
Oakville		10,635	284	439		363		6,000			76
Totals	3	18,459	467	720	863	538	1,587	6,000		1,706	76
PEEL :											
Brampton	3,130	18,898	619	55	2,368	100	725	6,406		4,755	298
YORK :											
Aurora	243	8,549	303	43	555	28		3,000			39
Newmarket	309	12,419	533	340	4,160		125	6,416			63
North Toronto	28	19,416	201	404	990	365		16,173			667
Toronto Junction	16,052	49,373	1,318	72	5,631	1,305					*4,304
Totals	16,632	89,757	2,355	859	11,386	1,698	125	25,589			5,078
ONTARIO :											
Oshawa		27,104	938	98				8,526			24
Uxbridge	211	10,849	490	371		166		7,900			289
Whitby	89	21,462	562	270		674	23,350	45,350			+10,040
Totals	300	59,415	1,990	739		840	23,350	61,776			10,353
DURHAM :											
Bowmanville	6,214	18,850	422	837				31,800		6,000	992
Port Hope	1,491	30,991	1,529	4,109	1,122	570	662	50,800	9,849		1,235
Totals	7,705	49,841	1,951	4,946	1,122	570	662	82,600	9,849	6,000	2,227
NORTHUMBERLAND :											
Cobourg	4,739	30,742	2,773	3,735		120		20,499			3,385
PRINCE EDWARD :											
Pictou	718	21,423	1,269	473	2,973	11					26
LENNOX AND ADDINGTON :											
Napanee	4,375	22,963	1,296	828		3					61
LEEDS :											
Brockville	47	71,754	4,900	3,978	18,412	3,771	2,840	122,983		17,641	2,575
Gananoque	3,081	19,471	1,858	235		332		27,000			83
Totals	3,128	91,225	6,758	4,213	18,412	4,103	2,840	149,983		17,641	2,658
GREENVILLE :											
Prescott		16,827	2,159	1,128				4,000			1
STORMONT :											
Cornwall	2,226	17,916	3,205	650	2,837	861	1,438	102,172		1,049	37
PRESBURY :											
Hawkesbury	387	5,522	199	41				2,500			
St Vankleek Hill		5,348		8							59
Totals	387	10,870	199	49				2,500			59
RENFREW :											
Arnprior	4,448	15,215	1,053	713		90		2,818	4,500		189
Pembroke		26,399	1,836	750	4,059			3,503		20,000	140
Renfrew	1,394	19,775	932	144	68	567		500		72,000	5,000
Totals	5,842	61,389	3,821	1,607	4,127	657		6,821	4,500	92,000	5,329

* Including \$3,366 for redemption of lands sold for taxes and for cost of advertising same.

† Refund of Martin Manufacturing Co.'s Loan, dropped from assets in 1895 report.

‡ Including \$1,368 Harbor Tolls. \$ Town incorporated 1897. Accounts for May to December inclusive.

TOWN MUNICIPALITIES.—Continued.

Disbursements.														
Total receipts.	Allowances, salaries and commissions.	Lighting of streets, water supply and fire protection.	Law costs.	Other expenses of municipal government.	Streets, bridges and parks.	Waterworks, gas and electric light construction.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	Administration of justice, including police services.	County treasurer for levies.	Payment on account of schools and education.	Sinking Fund investments and deposits.	Other investments and deposits.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
12,622	512	1,323	121	422	852	.....	67	5	55	105	321	1,278	1,277	.....
17,797	773	1,192	18	457	1,040	.....	.....	26	231	210	304	3,235	1,189	.....
30,419	1,285	2,515	139	879	1,892	.....	67	31	286	315	628	4,513	2,466	.....
37,354	860	2,234	.....	* 1,513	3,324	73	.....	92	572	361	886	5,500	.....	.....
12,760	725	1,019	15	332	794	.....	.....	.....	20	66	695	2,950	.....	.....
24,370	795	2,591	6	544	1,998	1,928	.....	16	30	43	833	4,330	656	175
38,244	1,503	2,510	508	475	620	.....	2,247	64	78	359	1,615	3,840	2,887	.....
78,055	2,872	10,598	2,705	+ 4,439	4,962	α 476	5	2,054	376	1,613	.....	11,453	.....	.....
153,429	5,895	16,718	3,234	5,790	8,374	2,404	2,252	2,134	504	2,081	3,143	22,573	3,543	175
36,690	982	2,900	103	399	2,737	.....	351	46	860	651	1,230	8,427	.....	.....
20,276	459	1,146	80	291	1,575	768	.....	26	321	128	619	3,200	1,336	.....
101,797	649	2,102	374	962	2,358	.....	.....	31	351	505	881	6,325	4,125	.....
158,763	2,090	6,148	557	1,652	6,670	768	351	103	1,532	1,584	2,730	17,952	5,461	.....
65,115	1,030	2,798	10	722	2,805	.....	75	10	956	1,312	1,171	9,935	.....	.....
102,358	2,359	4,016	7	1,001	2,783	63,217	.....	.....	217	1,310	1,625	10,090	782	938
167,473	3,389	6,814	17	1,723	5,588	3,217	75	10	1,173	2,622	2,796	20,025	782	938
65,993	2,454	5,420	15	1,622	2,447	.....	.....	283	559	1,588	.....	7,871	.....	.....
26,893	1,142	4,549	72	1,068	2,990	α 135	90	699	698	895	1,424	6,911	.....	.....
29,517	1,311	4,613	95	652	2,641	α 137	.....	125	636	722	2,100	8,675	.....	.....
248,901	3,510	17,661	716	4,540	16,644	α 13,987	.....	461	1,289	7,700	.....	20,598	13,695	2,830
52,060	775	2,529	24	590	2,734	.....	.....	42	147	1,431	1,314	6,900	2,292	.....
300,961	4,285	20,190	740	5,130	13,378	13,987	.....	503	1,436	9,131	1,314	27,498	15,987	2,830
24,115	1,415	1,992	1,175	970	1,843	.....	703	202	521	835	.....	5,430	.....	.....
132,391	1,693	6,560	514	1,171	5,629	α 93,488	.....	216	720	2,548	500	.....	2,877	682
8,649	322	172	3	14	804	.....	.....	.....	.....	300	.....	3,813	.....	.....
5,415	92	160	.....	α 368	576	.....	.....	15	22	.....	.....	1,750	.....	.....
14,064	414	332	3	332	1,380	.....	.....	15	22	300	.....	5,563	.....	.....
29,026	621	1,705	187	469	3,806	.....	412	1	121	535	1,384	12,193	523	.....
56,687	1,389	2,969	100	662	2,109	α 1,208	.....	65	138	365	2,370	9,189	.....	.....
100,380	580	1,313	175	694	1,931	α 55,153	2,516	129	240	508	1,105	7,957	.....	1,500
186,093	2,590	5,987	462	1,825	7,846	56,361	2,928	195	499	1,408	4,859	29,339	523	1,500

* Including \$845 for repairs of hall.

† Including \$2,852 for advertising tax sales, (a) \$467 for sewers, (b) Sewers, \$403, (c) Sewers, \$33, (d) Sewers, (e) \$7,244 for sewers, (f) \$323 for sewers, ‡ Including \$279 for expense of incorporation, (g) \$55 for sewers, (h) Sewers, \$2,153, § Hospital.

TABLE VII. - FINANCIAL STATEMENT. -

Town municipalities.	Disbursements.—Continued.						Assets			
	School debentures redeemed.	All other debentures redeemed.	Refund on moneys borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.
HALTON:	%	%	%	%	%	%	%	%	%	%
Milton	260	515		2,189	1,332	10,637	1,985	2,760		3,190
Oakville			6,213	1,496	1,413	17,797		3,684	10,361	
Totals	260	515	6,213	3,685	2,745	28,434	1,985	6,444	10,361	3,190
PEEL:										
Brampton	703	6,486	5,500	7,854	1,396	37,354		1,578		28,250
YORK:										
Aurora	775	347	3,000	1,566	87	12,391	369	2,057		200
Newmarket	366	1,275	5,416	2,982	67	24,051	319	434	1,164	175
North Toronto			15,993	4,298	1,247	38,244		14,895	12,565	
Toronto Junc.		400	3,357	7,011	* 3,523	55,844	22,211	117,127		
Totals	1,141	2,022	27,766	15,857	4,924	130,530	22,899	134,513	13,729	375
ONTARIO:										
Oshawa	1,200	511	13,785	2,242	266	36,690		4,832		
Uxbridge			6,497	2,317	308	19,371	905	4,649	2,633	2,500
Whitby		32,278	45,100	5,417	293	101,751	46	20,056		
Totals	1,200	32,789	65,382	9,976	867	157,812	951	29,537	2,633	2,500
DURHAM:										
Bowmanville		1,037	31,700	3,542	+ 6,786	63,909	1,206	10,777		
Port Hope	10,158	1,150	48,000	11,402	830	99,885	2,473	10,815	2,947	14,688
Totals	10,158	2,207	79,700	14,944	7,616	163,794	3,679	21,592	2,947	14,688
NORTHUMBERLAND:										
Cobourg		6,491	25,000	12,025	218	65,993		12,086		
PRINCE EDWARD:										
Pictou	329	2,873		2,426	94	26,395	498	5,933		
LENNOX AND ADDINGTON:										
Napanee	901	2,065		4,218	130	29,021	496	17,297		
LEEDS:										
Brockville			119,253	23,019	3,481	248,884	17	38,405	101,072	2,330
Gananoque			28,000	3,453	780	51,011	1,049	6,288	11,977	
Totals			147,253	26,472	4,261	299,895	1,066	44,693	113,049	2,330
GRENVILLE:										
Prescott	575	508	4,569	2,339	877	23,954	161	10,254		
STORMONT:										
Cornwall		6,371		8,081	1,391	132,391		18,775	14,951	+ 632
PRESCOTT:										
Hawkesbury			2,620	80	17	8,145	504	2,371		
Vankleek Hill						2,983	2,432	236		
Totals			2,620	80	17	11,128	2,936	2,607		
RENFREW:										
Arnprior	192	581	2,818	1,735	178	27,461	1,565	6,029	2,462	30,000
Pembroke	1,131	3,883	5,259	5,773	\$20,077	56,687		26,101		
Renfrew	111	1,066	1,500	1,751	341	78,570	21,810	12,073	450	1,500
Totals	1,434	5,530	9,577	9,259	20,596	162,718	23,375	44,203	2,912	31,500

* Including \$2,619 paid to County of York. + Including \$6,000 bonus to rubber factory.

‡ To credit of Water works Trust. § Including \$20,000 Railway Bonus.

TOWN MUNICIPALITIES.—Continued.

Assets.—Continued.								Liabilities.				
School lands and buildings.	Waterworks, gas and electric light.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
10,000	23,580	8,420	.....	49,935	.....	.....	.....	1,555	43,024	.....	.....	44,579
7,000	.....	19,935	14	40,994	425	1,911	.....	.....	25,500	2,000	585	30,421
17,000	23,580	28,355	14	90,929	425	1,911	.....	1,555	68,524	2,000	585	75,000
29,000	100,000	9,675	1,099	169,602	.....	3,988	.....	751	141,916	906	.....	147,561
23,300	16,700	10,072	1	52,699	.....	1,000	.....	13,404	12,230	2,120	49	28,803
29,000	40,232	*18,391	1,018	90,733	751	900	.....	15,165	42,137	1,042	.....	59,995
27,075	45,125	9,600	10,273	119,533	1,530	.....	.....	16,000	63,012	6,223	5,418	92,183
87,750	174,000	24,500	+500,000	925,588	.....	11,209	.....	\$	957,000	24,647	80,608	1,073,464
167,125	276,057	62,563	511,292	1,188,553	2,281	13,109	.....	44,569	1,074,379	34,032	86,075	1,254,445
23,000	.....	17,050	25	44,907	.....	.....	.....	.....	38,924	3,326	.....	42,250
12,000	10,000	9,600	125	42,412	.....	.....	9,000	15,000	15,900	+4,397	100	44,397
25,000	.....	23,000	408	68,510	.....	.....	.....	1,000	62,695	15,400	395	79,490
60,000	10,000	49,650	558	155,829	.....	.....	9,000	16,000	117,519	23,123	495	166,137
45,000	.....	21,000	296	78,279	.....	.....	.....	.....	73,384	10,700	.....	84,084
33,006	59,654	194,502	2,750	320,835	.....	.....	.....	9,691	223,451	10,300	538	243,980
78,006	59,654	215,502	3,046	399,114	.....	.....	.....	9,691	296,835	21,000	538	328,064
20,000	.....	155,000	1,436	188,522	1,625	174	.....	.....	202,600	1,499	852	206,750
19,300	50,500	11,725	939	88,945	1,256	4,020	3,050	345	37,823	.....	223	46,717
41,500	.....	21,773	869	81,935	2,100	5,980	30,000	16,074	23,522	.....	611	78,287
65,600	180,264	66,904	+100,040	554,632	.....	.....	52,000	40,000	410,663	42,000	927	545,590
60,000	30,000	27,000	2,500	138,814	.....	.....	19,000	26,536	21,000	8,500	816	75,852
125,600	210,264	93,904	102,540	693,446	.....	.....	71,000	66,536	431,663	50,500	1,743	621,442
14,397	.....	55,300	18	80,130	.....	4,804	.....	18,738	15,000	1,000	2,230	41,772
25,000	93,165	46,300	124	198,947	1,064	9,971	.....	25,000	106,249	102,172	.....	244,456
12,000	.....	200	.....	15,075	625	732	.....	.....	.....	2,160	.....	3,517
6,993	.....	740	135	10,536	400	1,700	.....	.....	.....	.....	57,350	9,450
18,993	.....	940	135	25,611	1,025	2,432	.....	.....	.....	2,160	7,350	12,967
21,000	.....	26,790	361	88,207	907	3,208	30,000	5,392	7,667	.....	300	47,474
22,500	61,550	29,025	60	139,236	2,392	10,626	20,000	14,317	91,914	1,503	.....	140,752
20,000	67,000	11,720	.....	134,553	1,127	3,493	22,998	6,782	73,513	1,000	.....	108,915
63,500	128,550	67,535	421	361,996	4,426	17,327	72,998	26,493	173,094	2,503	300	297,141

* Including \$2,891 for iron bridge. † Including \$350,000 for bridge and subway and \$150,000 for sewers. ‡ Including \$1,297 due Sinking Fund. § \$103,771 transferred to Consolidated Debentures.
 (a) Including Gardner Carriage Works security, \$21,800. (b) Including \$7,332 town's share of debenture debt of Tp. Hawkesbury W. (c) Including \$14,000 for sewers.

TABLE VII.—FINANCIAL STATEMENT.—

Town municipalities.	Receipts.										
	Balance from 1898	Municipal and school taxes.	Licenses.	Fees, rents, fines etc.	Water, gas and electric light rates.	Interest and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for other purposes.	Miscellaneous
	£	£	£	£	£	£	£	£	£	£	£
LANARK :											
Almonte	156	15,426	1,063	294				5,500		2,000	312
Carleton Place	8,725	17,767	1,554	72		404		3,500		26,700	199
Perth	3,142	20,495	1,529	407				4,800			131
Smith's Falls	12,251	22,625	1,607	587				6,350		2,500	318
Totals	24,574	76,313	5,753	1,360		404		20,150		31,200	960
VICTORIA :											
Lindsay	5,935	45,204	2,253	1,034		662		12,000			25
PETERBOROUGH :											
Peterborough	10,593	83,169	5,889	7,302		3,605	6,000	17,481			636
HASTINGS :											
Deseronto	6,287	17,886	959	29	532	21	1,720	1,167			604
Trenton	748	23,412	1,454	710		452	3,663	17,375			420
Totals	7,035	41,298	2,413	739	532	473	5,386	18,542			1,024
MUSKOKA :											
Bracebridge	6,408	9,755	364	194	4,315	305		1,950			151
Gravenhurst	388	6,745	232	132		150	5,000	7,500			2,342
Totals	6,796	16,500	596	326	4,315	455	5,000	9,450			2,493
PARRY SOUND :											
Parry Sound	1,746	10,475	27	130	1,368			15,900			81
NIPISSING :											
Mattawa	462	7,935	857	66		28		2,583			227
North Bay	946	11,454	1,065		3,150			14,409			8
Sturgeon Falls		1,498	359	1				463			
Sudbury	10	10,437	1,660	110	5,848			7,500			53
Totals	1,418	31,324	3,941	177	8,998	28		24,955			288
MANITOULIN :											
Gore Bay	406	2,705	115			24		500			8
Little Current	411	1,836	182	8							
Totals	817	4,541	297	8		24		500			8
ALGOMA :											
Sault Ste. Marie	2,500	24,952	780	194		631		9,993		215,644	1,675
Thessalon	924	3,631	266	5		44	1,400	1,700			
Totals	3,424	28,583	1,046	199		675	1,400	11,693		215,644	1,675
THUNDER BAY :											
Fort William	205	25,441	1,562	841		347	1,186	21,562		1,186	1,700
Port Arthur	2,710	27,118	2,603	634	11,754			13,888			2,781
Totals	2,915	52,559	4,165	1,475	11,754	347	1,186	35,450		1,186	4,541
RAINY RIVER :											
Rat Portage	528	33,440	3,262	576				5,144		40,000	4,100

ire Hall insurance, \$2,300. + Consolidated debt. ‡ Outstanding cheques. \$3,342.

TOWN MUNICIPALITIES.—Continued.

Total.	Disbursements.													
	Allowances, salaries and commission.	Lighting of streets, water supply and fire protection.	Law costs.	Other expenses of municipal government.	Streets, bridges and parks.	Waterworks, gas and electric light construction.	Building and other works.	Board of Health.	Support of the poor and other charities.	Administration of justice including police service.	County treasurer for levies.	Payment on account of schools and education.	Sinking Fund investments and deposits.	Other investments and deposits.
£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
25,051	753	1,532	8	1,038	2,309	.....	175	8	279	317	1,393	6,196	.....	.....
58,921	923	1,346	125	680	2,932	.....	10,273	218	210	525	1,417	6,000	.....	.....
30,504	821	2,437	4	1,676	3,581	180	.....	811	286	811	.....	8,237	.....	.....
46,238	1,099	2,801	.....	752	2,721	*1,287	.....	52	179	509	1,760	8,900	.....	.....
160,714	3,596	8,116	137	4,206	11,543	1,467	10,448	278	954	2,165	4,570	29,333	.....	.....
67,083	2,377	6,122	459	1,524	4,513	.....	2,478	561	694	2,200	2,646	13,876	3,067	.....
134,678	3,271	14,354	1,051	3,052	14,790	*11,492	.....	350	2,391	5,924	.....	27,800	4,731	15,840
29,205	399	2,010	50	416	1,598	9,566	.....	856	97	636	1,239	6,898	.....	21
48,237	1,575	3,041	1,168	1,638	1,820	.....	.....	62	848	1,381	.....	12,518	452	.....
77,442	1,974	5,051	1,218	2,054	3,418	9,566	.....	918	945	2,017	1,239	19,416	452	21
23,412	1,858	684	.....	409	1,566	4,801	.....	10	126	379	.....	3,290	2,203	.....
22,489	494	981	3	392	1,912	.....	1,793	.....	87	478	.....	4,053	.....	.....
45,931	2,352	1,665	3	801	3,478	4,801	1,793	10	213	857	.....	7,343	2,203	.....
29,727	560	2,182	.....	465	1,192	376	.....	88	159	365	.....	4,440	.....	.....
12,158	667	561	44	378	845	.....	1,000	178	25	595	.....	4,140	139	.....
31,032	765	2,312	30	673	2,417	620	24	98	127	456	.....	5,752	.....	.....
2,321	272	.....	27	237	490	.....	10	53	10	50	.....	633	.....	.....
25,618	1,135	3,274	247	538	844	4,249	25	28	268	250	.....	2,783	.....	.....
71,129	2,839	6,147	348	1,826	4,596	4,869	1,059	357	430	1,351	.....	13,308	139	.....
3,758	97	433	13	128	27	.....	.....	.....	50	245	.....	1,733	117	.....
2,437	214	47	9	145	226	.....	.....	.....	.....	193	.....	808	.....	.....
6,195	311	480	22	273	253	.....	.....	.....	50	438	.....	2,541	117	.....
256,369	1,948	+1,461	771	537	1,893	*509	.....	139	515	863	.....	5,806	631	.....
7,970	191	810	.....	188	648	.....	683	11	58	380	.....	1,040	100	.....
264,339	2,139	2,271	771	725	2,541	509	683	150	573	1,243	.....	6,846	731	.....
54,090	1,767	1,170	300	3,159	3,620	3,411	1,501	486	761	1,178	.....	5,678	6,311	.....
61,488	1,370	2,295	1,567	1,409	1,458	1,902	1,491	97	512	716	.....	4,597	1,204	.....
115,578	3,137	3,465	1,867	4,568	5,078	5,313	2,992	583	1,303	1,894	.....	10,275	7,515	.....
87,050	2,376	2,659	200	3,667	14,487	*5,160	3,257	267	285	1,330	.....	13,900	.....	.....

* Sewers. † See note (c) under liabilities. ‡ No further classification could be made for lack of details.

TABLE VII.—FINANCIAL STATEMENT.

Town municipalities.	Disbursements.—Continued.						Assets.			
	School debentures redeemed.	All other debentures redeemed.	Refund of moneys borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.
LANARK :	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Almonte	2,600	5,500	2,410	371	24,949	102	150			
Carleton Place...	700	2,600	2,500	2,613	*20,565	53,627	5,294			
Perth	2,400	4,800	1,370	1,222	27,828	2,676	989			
Smith's Falls	1,425	3,406	4,875	3,776	647	34,189	12,049	319		
Totals.....	2,125	11,006	17,675	10,169	22,805	140,593	20,121	1,458		
VICTORIA :										
Lindsay	157	2,300	12,000	10,111	664	65,749	1,334	20,846	18,877	300
PETERBOROUGH :										
Peterborough....	4,500		276	17,981	2,850	130,653	4,025	14,360	46,125	55,340
HASTINGS :										
Deseronto	511	720	1,545	1,966	677	29,205		1,082		963
Trenton	3,665		9,775	8,615	†1,436	47,994	243	35,490	16,693	
Totals..	4,176	720	11,320	10,581	2,113	77,199	243	36,572	16,693	963
MUSKOKA :										
Bracebridge	209	1,187		2,320	‡3,786	22,828	614	4,133	6,587	
Gravenhurst	282	975	3,650	1,562	5,756	22,418	71	9,508		
Totals.....	491	2,162	3,650	3,882	9,542	45,246	685	13,641	6,587	
PARRY SOUND :										
Parry Sound	113	649	16,250	2,293	335	29,467	260	7,104		
NIPISSING :										
Mattawa		693	1,300	1,135	272	11,972	186	6,565	834	
North Bay	219	835	12,192	3,209	726	30,455	577	8,799		
Sturgeon Falls			172	7	360	2,321		2,961		
Saibury		1,256	4,600	2,730	95	22,222	3,396	7,244		
Totals.....	219	2,784	18,164	7,081	1,453	66,970	4,159	25,569	834	
MANITOULIN :										
Gore Bay			600	194	100	3,737	21	1,278	1,138	
Little Current....	49	107		176	225	2,199	238	610		
Totals.....	49	107	600	370	325	5,936	259	1,888	1,138	
ALGOMA :										
Sault Ste. Marie..	12,300	201,310		\$23,846	3,840	256,369		19,307	27,954	260,000
Thessalon	1,400		1,600	225	99	7,433	537	433		
Totals.....	13,700	201,310	1,600	24,071	3,939	263,802	537	19,740	27,954	260,000
THUNDER BAY :										
Fort William....			14,500	7,373	‡2,272	53,487	603	16,441	23,116	
Port Arthur			11,600	13,280	a16,776	60,304	1,184	35,037	b15,953	
Totals.....			26,100	20,653	19,048	113,791	1,787	51,478	39,069	
RAINY RIVER :										
Rat Portage.....	697	1,900	29,000	4,092	c2,759	86,036	1,014	12,909		

* Including \$20,000 loan to Ry. † Including \$1,000 to County. ‡ Including \$3,157 amount of late treasurer's deficit. § Including \$2,127 extra for exchanged debts, and \$800 brokerage on exchange of debts. Involving tax rebates \$583, and celebration money \$116. a \$13,070 paid by town for land sold for taxes, \$8,166 for E. Ry. maintenance and \$2,511 for E. lights. b A decrease of \$39,160 written off as per provision of the Port Arthur Act 1897. c Including \$2,258 outstanding cheques of 1895 and 1896.

TOWN MUNICIPALITIES. — *Continued*

Assets. — Continued.					Liabilities.							
School lands and buildings.	Waterworks, gas and Electric light plant.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
30,000		60,500	286	91,038					43,100		476	43,576
18,000		52,700		75,994			19,300	700	47,800	1,000		68,800
36,000		27,000		66,665		2,474	7,000		16,000			25,474
47,000		*46,000	5,218	110,586			13,400	12,026	39,585	6,587		71,598
131,000		186,200	5,504	344,283		2,474	39,700	12,726	146,485	7,587	476	209,448
80,200		42,442	187	164,186	3,004			46,309	147,500	14,092	2,036	212,941
82,516		370,550	29,307	602,223				61,900	199,150	+63,451	5,729	330,230
28,187	39,974	4,710	37	74,953				8,535	37,280	1,167		46,982
15,500	12,000	128,150		208,076		2,119	10,000		138,267	14,100	†3,701	168,187
43,687	51,974	132,860	37	283,029		2,119	10,000	8,535	175,547	15,267	3,701	215,169
8,000	40,000	11,075	1,459	71,868		1,549		7,220	43,358	\$1,950	477	55,054
15,000		11,100		35,679		3,386		10,908	13,516	6,265	2,790	36,865
23,000	40,000	22,175	1,459	107,547		4,935		18,128	57,374	8,215	3,267	91,919
11,500	36,785	2,800	693	59,142				6,079	31,008	6,500	30	43,617
		11,032	65	18,682		1,910			19,644	‡2,811	426	24,791
8,000	48,090	2,500	1,946	69,912		2,742		4,862	42,969	9,708	1,901	62,182
5,000			179	8,140		937				1,584	2,632	5,153
4,500	60,000	1,050	1,507	77,697		1,690		746	50,124	α5,241	3,431	61,232
17,500	108,090	14,582	3,697	174,431		7,279		5,608	112,737	19,344	8,390	153,358
3,200		2,000	11	7,648		938		1,850		527	110	3,425
2,160		2,957	44	6,009				596	2,176			2,772
5,360		4,957	55	13,657		938		2,446	2,176	527	110	6,197
19,000		17,125	‡39,546	382,932		4,522		6,000	383,384	16,257	α40,873	451,036
2,500		2,855		6,325		590			2,000	637	25	3,252
21,500		19,980	39,546	389,257		5,112		6,000	385,384	16,894	40,898	454,288
31,000	3,818	22,390	‡22,721	120,039			15,000	28,000	78,105	‡31,580	831	153,516
24,400	121,108	10,288	‡23,147	236,117		7,861	25,000	22,500	193,250	‡31,749	‡18,390	298,750
55,400	124,926	32,678	50,868	356,206		7,861	40,000	50,500	271,355	63,329	19,221	452,266
30,000		14,666	502	59,091		7,250		18,976	71,027	5,144	3,806	106,203

* Including \$10,000 for iron bridge. † Including \$25,075 due Sinking Fund. ‡ Including \$3,000 payable to County. § Due Sinking Fund. ¶ Including \$139 due Sinking Fund. α Omitting \$6,516 reported in 96 as expn. on W. W., etc., but really a refund of borrowed money. β Including \$37,269 interest to be paid by Power Co. γ Including \$21,093 mt'gs and notes given to Power Co., and \$16,090 for water & light accts. δ Including local imp.—sewers \$11,902; streets \$7,202, and \$2,576 for P.S.D.W. Ry. ε Including \$12,080 due Sinking Fund. ζ Including \$12,366 land bought for taxes and \$10,000 loss by fire due from Ins. Cos. Including \$11,749 due Sinking Fund, which is a decrease of \$39,169 written off as per prov. of Pt. Arthur Act 1897. η Includ. \$11,500 Electric Light plant notes.

FINANCIAL STATEMENT—

TABLE VIII.—Showing the Receipts, Disbursements, Assets and Liabilities of the

Village municipalities.	Receipts.									
	Balance from 1896	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Water, gas and electric light rates.	Interest and dividends.	Refund of money invested	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for other purposes.
	£	£	£	£	£	£	£	£	£	£
ESSEX :										
Belle River.....	584	1,233	140	13						1
Kingsville.....	1,091	9,720	159	133	2,198		6,888	48,956		2,073
Totals.....	1,675	10,953	299	146	2,198		6,888	8,956		2,074
KENT :										
Thamesville.....	692	6,572	177	12				1,200		78
Tilbury.....	3,187	2,225	267	3	1,602	70	362	1,806		82
Totals.....	3,879	8,797	444	15	1,602	70	362	3,006		160
ELGIN :										
Dutton.....	309	3,001	82	24				3,500		641
Port Stanley.....	139	1,833	308	69				1,300		
Springfield.....	600	1,338	42					300		
Vienna.....	561	1,432	48	21		6				
Totals.....	1,609	7,604	480	114		6		5,100		641
NORFOLK :										
Delhi.....	399	3,314	138	35	37			600		233
Port Dover.....	344	5,648	254					500		12
Port Rowan.....	104	2,918	73	1		16		1,889		10
Waterford.....	267	6,453	195	3				242		17
Totals.....	1,114	18,333	660	39	37	16		3,231		272
HALDIMAND :										
Caledonia.....	1,268	3,806	365	34		44				60
Cayuga.....	111	3,681	308	71		8		1,100		3
Dunnville.....		11,017	584	61	1,136			476		155
Hagersville.....	368	4,067	109	11				700		
Totals.....	1,747	22,571	1,366	177	1,136	52		2,276		218
WELLAND :										
Bridgeburg.....	3,230	6,508	165	7				970		55
Chippawa.....	469	1,596	259	98		7				
Fort Erie.....		3,051	154	244				1,296		131
Niagara Falls S.....	1,041	6,845	99		700			1,500		343
Port Colborne.....	379	4,753	287	60				500		46
Totals.....	5,119	22,843	964	409	700	7		4,266		575
LAMETON :										
Alvinston.....	510	4,516	529	4				1,000		304
Arkona.....	163	1,316	163	55				275		89
Oil Springs.....		5,559	377	35				1,000		216
Point Edward.....		3,544	458	10				400		
Thedford.....	163	1,530	53	37				1,650		
Watford.....	1,318	6,109	691	13				3,600		99
Wyoming.....	529	2,722	319	8				700		80
Totals.....	2,683	25,296	2,590	162				8,625		758

* Gas Co's securities surrendered on purchase of plant by Village.
School Boards and Discounts.

† Including \$4,500 loans for

VILLAGE MUNICIPALITIES.

village municipalities in the Province of Ontario, for the year ending December 31st, 1897.

Disbursements.														
Total receipts.	Allowances, salaries and commissions.	Lighting of streets, water supply and fire protection.	Law costs.	Other expenses of municipal government.	Streets, bridges and parks.	Waterworks, gas and electric light construction.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	Administration of Justice, including police service.	County treasurer for levies.	Payments on account of schools and education.	Sinking Fund investments and deposits.	All other investments and deposits.
¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢
1,971	160			46	473				39	5		609		
49,508	830	701	1,328	235	300		*28,256	40	12	62	328	1,897		
51,479	990	701	1,328	281	773		28,256	40	51	67	328	2,506		
8,731	180	772		227	1,394			34	25	151	512	1,600		
9,604	356	2,468	16	145	514	87		22	113	16	280	638	147	350
18,335	536	3,240	16	372	1,908	87		56	138	167	792	2,238	147	350
11,057	170	94		103	577	1,153	2,953	64	11	84		788		
3,649	251	105		104	756		124	129	10	10	122	768		
2,280	130	26	3	58	498		140	13	5	2	124	460		
2,068	201			69	392			1		19	121	688	91	
19,054	752	225	3	334	2,223	1,153	3,217	207	26	115	367	2,704	91	
4,756	162	51	2	135	724			2	10	2	235	1,681		
6,758	302	262	2	95	1,151		200	7	18	26	385	1,899		
5,011	123	320		94	489			5			188	1,070		
7,177	375	124	17	104	747			18	22	16	506	2,362		
23,702	962	757	21	428	3,111		200	33	50	44	1,314	7,012		
5,577	367	261	2	101	506			14	25	69	318	1,800		
5,282	312	330	50	143	615		51		141	5		1,750		
13,429	681	2,931	23	293	3,553		534	48	224	265	680	2,300		
5,255	176	179	16	132	753			1	12	10	455	1,821		
29,543	1,536	3,701	91	669	5,427		585	63	402	349	1,453	7,671		
11,025	356		108	178	1,111		448	40	15	20	1,455	2,931		23
2,429	124	3		102	433		118	10	27	14	193	1,013		
4,876	218	17	20	242	1,176		55	20	21	48	227	1,281		
10,528	285	1,008	10	134	673			115	66	24	375	2,089		
6,025	354	262		153	1,475				4	25	434	1,750		
34,883	1,337	1,290	138	809	4,868		621	185	133	131	2,684	9,064		23
6,863	399	712	206	112	257		173		93	17	378	2,270		
2,061	74	50		68	430			5	44	96	113	600		
7,187	397			175	964		290	150	5	135		1,580		
4,412	344	88	29	145	438				18	440	205	2,245		
3,433	94	22	5	51	221			21	1	15	122	950		
11,830	488	501	6	175	1,060		195	30	11	168	269	2,640		200
4,358	283		20	101	550			10	23	5	178	1,596		
40,144	2,079	1,373	266	827	3,920		658	216	195	876	1,265	11,881		200

* Gas plant.

† Including \$300 loan on note due May, 1900.

FINANCIAL STATEMENT—

TABLE VIII.—Showing the Receipts, Disbursements, Assets and Liabilities of the

Village municipalities.	Disbursements.—Continued.						Assets.			
	School debentures redeemed.	All other debentures redeemed.	Refund of moneys borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.
	£	£	£	£	£	£	£	£	£	£
ESSEX :										
Belle River					98	1,430	541	387		
Kingsville	444	4,127	6,200	2,574	1,262	48,596	912	8,194		
Totals.	444	4,127	6,200	2,574	1,360	50,026	1,453	8,581		
KENT :										
Thamesville	420	207	1,600	373	139	7,634	1,097	631		
Tilbury	211	1,733	7	1,326	320	8,749	855	4,314	332	*350
Totals.	631	1,940	1,607	1,699	459	16,383	1,952	4,945	332	350
ELGIN :										
Dutton	105	79	3,930	243	606	10,960	97	519		
Port Stanley		246	800	37	50	3,512	137	885		
Springfield			569		28	2,056	224	145		
Vienna			91	150	7	1,830	238	832	182	
Totals.	105	325	5,390	430	691	18,358	696	2,381	182	
NORFOLK :										
Delhi			600	27	742	4,373	383	1,273		
Port Dover	139	478	500	406	432	6,302	466	1,084		
Port Rowan	121		2,100	101	399	5,011		248		
Waterford	538	814	242	735	164	6,784	393			
Totals.	798	1,292	3,442	1,269	1,737	22,470	1,232	2,605		
HALDIMAND :										
Caledonia		1,000		417	68	4,948	629	476		
Cayuga		437	800	224	84	4,942	340	884		
Dunnville		679		1,015	203	13,429		4,769		
Hagersville	243		700	258	40	4,796	459	977		
Totals.	243	2,116	1,500	1,914	395	28,115	1,428	7,106		
WELLAND :										
Bridgeburg			970	30	2,332	10,017	1,008	558		23
Chippawa					20	2,057	372	136		+500
Fort Erie		368	580	453	150	4,876		581		
Niagara Falls S.		665	1,500	739	587	8,270	2,258	374		
Port Colborne	269		500	24	62	5,312	713	19		
Totals.	269	1,033	3,550	1,246	3,151	30,532	4,351	1,668		523
LAMETON :										
Alvinston	287	242	1,000	278	31	6,455	408	50		
Arkona			275	15	8	1,778	283	4		
Oil Springs	378	1,518	258	1,012	285	7,147	40	3,103		
Point Edward			416	5		4,373	39	1,572		
Thedford			1,350	29	515	3,396	37	35		
Watford	587	475	3,600	723	91	11,219	611	40		200
Wyoming		400	700	70	60	3,996	362	359		
Totals.	1,252	2,635	7,599	2,132	990	38,364	1,780	5,163		200

Temporary loan to School Board.

† Trust Funds, bequest of late Mrs. Macklem, for benefit of poor.

VILLAGE MUNICIPALITIES.

village municipalities in the Province of Ontario, for the year ending December 31st, 1897.

Assets.—Continued.					Liabilities.							
School lands and buildings.	Waterworks and electric light plant.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
350		700		1,978	55	267					15	337
8,000	50,000	10,200	1,264	78,570	329	1,904	6,415	5,135	44,594	5,831	2,051	66,259
8,350	50,000	10,900	1,264	80,548	384	2,171	6,415	5,135	44,594	5,831	2,066	66,596
10,300	1,000	8,800	605	22,133		1,600		2,430	3,722		226	7,978
5,500	17,855	1,120	3,860	34,186	229	724		3,788	20,652	2,138	682	28,213
15,500	18,855	9,920	4,465	56,319	229	2,324		6,218	24,374	2,138	908	36,191
8,000		4,614		13,230	189	321		2,373	4,421		*2,247	9,551
2,000		1,590		4,612	145	26				521	162	854
4,000		634	43	5,046	143						193	336
3,080		1,550		5,882		200	3,000				25	3,225
17,080		8,388	43	28,770	477	547	3,000	2,373	4,421	521	2,627	13,966
4,500		45		6,201		1,034					2,275	3,309
6,500		4,500		12,540		886		2,200	5,967			9,053
5,000		30	71	5,349				704		189	35	928
15,900		1,000		17,293			776	8,415	4,284			13,475
31,900		5,575	71	41,383		1,920	776	11,319	10,251	189	2,310	26,765
9,000		6,800		16,905			6,000					6,000
3,300		6,300		10,824	198				3,763	300	68	4,329
8,000	12,000	9,500	533	34,802	720	2,879			11,277	5,177		20,053
+13,000		175		14,611		1,014		4,523			83	5,620
33,300	12,000	22,775	533	77,142	918	3,893	6,000	4,523	15,040	5,477	151	36,002
11,650		1,400		14,639	1,488						+5,664	7,152
2,875		3,300		7,183								
2,142		9,775		12,498					8,328	1,196	103	9,627
10,361	10,600	1,200	206	24,999					13,274	1,000	\$2,077	16,351
3,500		1,990		6,222							69	69
30,528	10,600	17,665	206	65,541	1,488				21,602	2,196	7,913	33,199
5,800	1,896	5,062		12,710			745	1,363	869		23	3,000
3,000		1,200		4,487		239						239
4,725		4,200	32	12,100	214		6,250	498	8,699	1,000		16,661
7,000	2,000	2,200	75	12,886	205	450						655
1,000		70	6	1,148						300		300
19,000		5,800		25,651				11,875	2,165			14,040
6,000		500		7,221					400			400
46,525	3,390	19,032	113	76,203	419	689	6,995	13,736	12,133	1,300	23	35,295

* To Dunwich re school debentures omitted from previous returns.

† Including High School

not previously reported.

‡ Payable to Bertie Tp. for school debentures.

§ Share of debentures

(School) payable to Stamford.

TABLE VIII.—FINANCIAL STATEMENT—

Village municipalities.	Receipts.										
	Balance from 1896.	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Water, gas and electric light rates.	Interest and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for other purposes.	Miscellaneous.
	%	%	%	%	%	%	%	%	%	%	%
HURON :											
Bayfield		1,307	83	35							18
Blyth	782	4,300	188			148	202	2,430			18
Brussels	1,190	6,330	387	240		141	105				21
Exeter	2,724	9,029	513	33	198	15		2,400			33
* Hensall		2,998	136					800			146
Wroxeter	321	1,369	134			139					12
Totals	5,017	25,333	1,441	308	198	443	307	5,630			253
BRUCE :											
Chesley	2,196	7,855	289	50		18		11,950	15,000		†787
Lucknow	2,209	5,800	520	21		125		‡ 3,844			
Paisley	838	6,180	432	396				1,650			876
Port Elgin		8,482	631	267		17		2,000		6,400	\$1,821
Southampton	1,872	4,074	376	50						1,700	104
Tara	488	2,836	225	8		261	500				155
Teeswater	2,001	4,566	220	53		83					7
Tiverton	9	1,460	119	26							535
Totals	9,613	41,253	2,812	871		504	500	19,444	15,000	8,100	4,285
GREY :											
Dundalk	286	2,174	241								26
Markdale	467	2,304	223	36		2					302
Totals	753	4,478	464	36		2					328
SIMCOE :											
Beeton	41	2,565	179	66	988		450	700			14
Bradford		4,915	117	144		212	2,200	6,582			
Creemore	137	2,499	211	13							
Tottenham		2,982	138	100							108
Totals	178	12,961	645	323	988	212	2,650	7,282			122
MIDDLESEX :											
Ailsa Craig	110	2,595	220	18		5	472	700			2
Glencoe	984	5,546	530	16				3,000			86
Lucan	1,827	3,576	208	66		120					
Newbury	56	1,512	125	2				394			283
Wardsville	151	922	99	21							17
Totals	3,128	14,151	1,182	123		125	472	4,094			388
OXFORD :											
Embro	893	2,756	135	132							134
Norwich	459	6,724	331	52		58		1,500			‡1,298
Totals	1,352	9,480	466	184		58		1,500			1,432
PERTH :											
Milverton	1,899	2,059	189	4						6,000	90

* Incorporated in 1897. † Including \$317 previously omitted. ‡ Including \$3,344 aggregate of yearly payments not made to Sinking Fund. § From Ont. Govt. for pier at harbor. || Including \$1,199 Insurance money re Pickle Factory.

VILLAGE MUNICIPALITIES.—Continued.

Disbursements.														
Total receipts.	Allowances, salaries and commissions.	Lighting of streets, watersupply and fire protection.	Law costs.	Other expenses of municipal government.	Streets, bridges and parks.	Waterworks, gas and electric light construction.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	Administration of justice, including police services.	County treasurer for levies.	Payments on account of schools and education.	Sinking Fund investments and deposits.	All other investments and deposits.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1,443	102	135	14	65	235	.....	.....	22	12	66	101	555	.....	.....
8,068	257	951	50	127	497	.....	.....	10	7	117	424	794	516	.....
8,414	590	635	5	268	312	.....	.....	25	35	100	336	1,776	1,650	.....
14,950	597	915	107	268	1,017	.....	60	13	75	290	927	3,030	.....	.....
4,080	47	633	5	124	905	.....	.....	7	8	2	187	763	.....	.....
1,975	199	.....	.....	53	209	.....	.....	.....	32	.....	120	498	383	.....
38,930	1,792	3,269	181	905	3,175	.....	60	77	169	575	2,095	7,416	2,549	.....
38,145	204	762	.....	430	723	.....	172	62	1	*421	362	16,550	.....	.....
12,519	324	1,353	50	55	722	.....	.....	1	18	137	224	1,494	4,311	.....
10,372	149	764	6	411	2,409	.....	.....	7	12	78	408	1,962	.....	.....
19,618	665	442	29	363	1,131	.....	11,064	115	103	2	432	3,500	.....	1,780
8,176	256	416	44	222	1,748	.....	990	1	101	.....	269	1,785	.....	.....
4,473	138	.....	.....	125	508	.....	.....	15	6	32	258	1,098	129	.....
6,930	178	531	46	96	625	62	.....	11	53	130	305	1,994	375	.....
2,149	79	.....	.....	119	170	.....	.....	.....	.....	14	135	650	.....	.....
102,382	1,993	4,268	175	1,821	8,036	62	2,226	212	294	814	2,393	29,033	4,815	1,780
2,727	165	54	.....	99	569	.....	.....	32	126	51	.....	600	.....	.....
3,334	84	208	18	101	241	.....	.....	10	54	.....	460	1,007	.....	.....
6,061	249	262	18	200	810	.....	.....	42	180	51	460	1,607	.....	.....
5,003	185	229	151	175	318	.....	.....	.....	4	.....	200	1,278	.....	.....
14,170	606	194	5	123	603	.....	.....	25	4	76	299	2,200	2,711	.....
2,866	110	108	5	177	406	.....	.....	5	13	50	349	1,249	.....	.....
3,328	154	112	.....	64	81	.....	.....	.....	.....	.....	354	1,200	.....	.....
25,361	1,055	643	161	539	1,408	.....	.....	30	21	126	1,202	5,927	2,711	.....
4,122	150	116	.....	103	272	.....	.....	102	8	41	212	1,312	.....	461
10,162	217	496	.....	170	1,808	.....	.....	111	12	18	773	1,922	.....	.....
5,797	252	1	11	62	615	.....	.....	14	1	48	286	1,317	392	.....
2,372	146	.....	.....	53	367	.....	224	2	10	9	273	426	.....	.....
1,210	64	19	2	73	159	.....	.....	14	9	2	100	745	.....	.....
23,663	829	632	13	461	3,221	.....	224	243	40	118	1,644	5,722	392	461
4,050	162	.....	.....	67	635	.....	.....	10	26	114	311	1,012	.....	.....
10,422	317	935	21	258	1,275	.....	.....	4	54	104	440	1,619	332	1,199
14,472	479	935	21	325	1,910	.....	.....	14	80	218	751	2,631	332	1,199
10,235	157	20	75	237	437	.....	.....	.....	16	.....	182	2,175	.....	.....

* Including \$400 salary of Constable formerly returned as salary. † Pier at harbor. ‡ Pickle Factory insurance.

TABLE VIII.—FINANCIAL STATEMENT—

Village municipalities.	Disbursements.—Continued.						Assets			
	School debentures redeemed	All other debentures redeemed.	Refund of money borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.
	%	%	\$	\$	\$		%	%	\$	\$
HURON :										
Bayfield			28	17	1,352		91	922		
Blyth	98		3,129	807	107	7,891	177	223	5,818	1,265
Brussels				2,442		8,174	240		3,960	
Exeter		438	2,400	850	140	11,127	3,823	98		
*Hensall			800	24	160	3,665	415			
Wroxeter				240	1	1,735	240	156	2,777	
Totals	98	438	6,357	4,363	425	33,944	4,986	1,399	14,555	1,265
BRUCE :										
Chesley		222	11,950	470	2,261	34,590	3,555			
Lucknow			500	1,125	187	10,501	2,018	2,478	8,051	†3,250
Paisley	222	470	2,150	206	225	9,479	893	131		
Port Elgin	354	1,936	*3,807	1,379	250	17,352	2,266	1,291		1,780
Southampton	107	294		497	214	6,944	1,232	2,589		
Tara		500		156	896	3,861	612		1,550	500
Teeswater				510	173	5,089	1,841	6	1,875	
Tiverton			400	231	64	1,862	287	816	1,500	
Totals	683	3,422	18,807	4,574	4,270	89,678	12,704	7,341	12,976	5,530
GREY :										
Dundalk		232		103	653	2,684	43	529		
Markdale	223	83		265	464	3,218	116	293		
Totals	223	315		368	1,117	5,902	159	822		
SIMCOE :										
Beeton		594	700	273	44	4,151	852	84		450
Bradford	305	190	6,192	611	26	14,170		3,835	3,896	
Creemore					318	2,790	70	1,377		
Tottenham	468	137	292	269	19	3,150	178	377		
Totals	773	921	7,184	1,153	407	24,261	1,100	5,673	3,896	450
MIDDLESEX :										
Ailsa Craig	211	171	700	105	71	4,035	87	111		572
Glencoe	545	150	3,000	488	159	9,869	293	397		
Lucan	1,000			\$365	3	4,567	1,230	300	2,574	
Newbury	300	100	275	155	32	2,372		54		
Wardsville					12	1,199	11	389		
Totals	2,056	421	3,975	1,313	277	22,042	1,621	1,771	2,574	572
OXFORD :										
Embro		128	300	171	29	2,965	1,085	106		
Norwich	333	210	1,500	787	53	9,441	981	714	2,324	1,199
Totals	333	338	1,800	958	82	12,406	2,066	820	2,324	1,199
PERTH :										
Milverton		221	5,683	384	10	9,597	638	16		

* Including \$1,100 temporary loan for schools in 1896 but omitted from report. † Omitting \$750 rebate on mortgage of Cliff & Foster for payment made and omitted from previous returns. § Including \$7 int. on Co. Rates.

VILLAGE MUNICIPALITIES.—Continued.

Assets.—Continued.					Liabilities.							
School lands and buildings.	Waterworks and electric light plant	Other property.	Miscellaneous.	Total assets	County levy.	Local school rates.	Railway debentures.	School debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1,850	...	750	...	3,613	121	...	...	...	...	...	...	121
6,300	800	4,350	...	18,970	382	600	...	5,308	8,300	* 3,690	...	18,280
9,000	...	6,000	375	21,575	...	...	...	7,500	32,200	...	...	39,700
8,250	750	8,700	400	22,051	...	2,777	8,704	...	7,250	...	...	18,731
3,000	...	633	...	4,048	...	...	...	...	...	...	355	355
1,000	...	1,400	...	5,573	...	...	4,000	...	...	...	...	4,000
29,400	1,550	21,833	812	75,800	503	3,377	12,704	12,808	47,750	3,690	355	81,187
14,200	...	9,900	14,001	41,656	...	...	...	15,000	3,699	...	14,300	32,999
10,000	10,000	5,800	...	41,597	266	...	...	...	19,500	† 3,344	...	23,110
7,500	9,900	8,150	...	26,574	...	...	...	...	2,732	...	...	2,732
10,000	...	4,800	30	20,167	...	2,500	...	5,797	12,428	...	89	20,814
10,000	...	5,100	...	18,921	...	...	...	2,505	7,108	...	...	9,613
2,500	...	485	...	5,647	...	...	...	...	2,100	...	1,561	3,661
5,700	8,873	6,888	...	25,213	...	...	...	...	10,500	...	...	10,500
2,000	...	2,000	...	6,603	...	128	...	...	3,000	700	...	3,828
61,900	28,773	43,123	14,031	186,378	266	2,628	...	23,302	61,067	4,044	15,950	107,257
2,000	...	510	20	3,102	206	283	...	...	1,640	...	1,968	4,097
6,000	...	2,219	267	8,895	...	...	...	4,146	837	...	35	5,018
8,000	...	2,729	287	11,997	206	283	...	4,146	2,477	...	2,003	9,115
5,001	30,000	6,040	185	42,611	48	...	...	...	17,478	...	262	17,788
9,000	...	9,300	25	26,060	300	1,300	...	7,409	1,796	915	310	12,030
3,500	...	250	...	5,197	285	576	...	...	...	...	580	1,441
4,400	...	3,300	60	8,315	...	...	...	2,328	1,739	...	25	4,092
21,900	30,000	18,890	274	82,183	633	1,876	...	9,737	21,013	915	1,177	35,351
3,000	...	1,465	1	5,236	...	...	...	470	374	...	...	844
14,000	225	1,000	330	16,245	380	133	...	7,425	705	...	15	8,658
13,000	...	1,900	...	19,004	147	...	...	9,800	...	...	...	9,947
3,000	...	1,800	† 660	6,034	126	...	...	1,500	300	120	91	2,137
5,000	...	900	...	6,300	191	125	...	...	...	...	29	345
38,000	225	7,065	991	52,819	844	258	...	19,195	1,379	120	135	21,931
4,000	...	7,300	...	12,491	...	732	...	...	2,915	...	...	3,647
12,000	...	5,400	1,162	23,780	...	...	...	9,348	6,217	...	...	15,565
16,000	...	12,700	1,162	26,271	...	732	...	9,348	9,132	...	...	19,212
6,300	...	30	...	6,984	...	...	...	...	5,779	...	...	5,779

* Including \$3,321 due Sinking Fund. † Due Sinking Fund. ‡ Payable by Mosa as share of school debentures being five annual payments of \$132 each exclusive of interest.

TABLE VIII.—FINANCIAL STATEMENT—

Village municipalities.	Receipts.										
	Balance from 1896.	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Water, gas and electric light rates.	Interest and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for other purposes.	Miscellaneous.
	£	£	£	£	£	£	£	£	£	£	£
WELLINGTON:											
Arthur	129	5,692	461	157		154		1,800			161
Clifford	627	1,696	78	170		15					406
Drayton	29	4,254	350	16		9		4,100		800	229
Elora	1,206	7,029	206	395							346
Erin	61	1,263	138					300			14
Fergus	2	10,337	560	387		1,905	*15,196	1,146			1,134
Totals	2,054	30,181	1,793	1,125		2,083	15,196	7,346		800	2,290
WATERLOO:											
Ayr		4,571	179	3		97		402			7
Elmira	437	2,167	213	6		16					5
Hespeler	26	7,689	123	90		13		6,823			277
New Hamburg	2,676	7,214	374	69						3,500	297
Preston	2,279	9,691	471	8		493	1,000	2,300	900	5,900	616
Totals	5,418	32,242	1,360	176		619	1,000	9,527	900	8,500	1,202
DUFFERIN:											
Shelburne	60	5,679	325	189		54	900	1,900			355
LINCOLN:											
Beamsville		3,959	210	23	404	45		2,000			186
Grimby	664	5,078	141	9				3,352		2,000	482
Merrittton		14,441	330	269	2,788	20	132				6
Port Dalhousie	1,410	4,467	702	15				1,000			
Totals	2,074	27,945	1,383	316	3,142	65	132	6,352		2,000	674
WENTWORTH:											
Waterdown	766	1,806	119	3							1
HALTON:											
Acton	753	5,096	345	108		46		400			86
Burlington	401	4,359	312	45		113		1,500			96
Georgetown		7,341	256	337	2,053			300			281
Totals	1,154	16,706	913	490	2,053	159		2,200			463
PEEL:											
Bolton	72	2,296	232	126				550			2
Streetsville	305	2,285	160	2				150			
Totals	377	4,581	392	128				700			2
YORK:											
East Toronto	640	10,981	152		1,021	155	1,005	21,625			34
Holland Landing	80	1,323	10	12				300			59
Markham	1,539	4,673	115	72		15					2
Richmond Hill	242	2,243	228	204		31		950	3,000		206
Stouffville	381	3,476	132	5				521			3
Sutton	35	1,831	101	6				300			1
Weston	301	4,923	340	131		21					187
Woodbridge	725	1,605	260			135	800				391
Totals	3,943	30,155	1,338	430	1,021	357	1,805	22,996	3,000		883

* Including \$1,040 from Memorial Relief Fund.

VILLAGE MUNICIPALITIES.—Continued.

Total receipts.	Disbursements.													
	Allowances, salaries and commissions.	Lighting of streets, water supply and fire protection.	Law costs.	Other expenses of municipal government.	Streets, bridges and parks.	Waterworks, gas and electric light construction.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	Administration of Justice, including police service.	County treasurer for levies.	Payments on account of schools and education.	Sinking Fund investments and deposits.	All other investments and deposits.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
8,554	642	.....	30	136	578	.....	.....	10	.....	275	487	2,104	643	.....
2,902	259	50	.....	75	497	.....	.....	.....	14	5	204	729	.....	325
9,787	173	229	18	268	595	.....	227	12	5	37	278	1,390	.....	.....
9,182	362	481	5	297	1,104	.....	.....	12	1	374	588	2,831	.....	.....
1,776	113	65	17	89	370	.....	.....	15	19	.....	179	525	.....	.....
30,667	465	721	5	229	2,847	.....	.....	.....	16	400	841	4,895	.....	*2,818
62,868	2,014	1,546	75	1,094	5,991	.....	227	49	55	1,091	2,577	12,474	643	3,143
5,259	233	102	.....	139	799	.....	.....	5	15	6	384	1,734	513	.....
3,844	241	173	.....	68	346	.....	.....	26	.....	45	384	1,446	.....	.....
15,043	526	1,261	17	334	765	.....	.....	4	5	6	690	3,034	.....	.....
14,130	329	504	6	390	848	.....	.....	6	56	63	452	4,300	.....	+3,500
22,668	486	1,719	525	317	756	.....	.....	25	41	186	906	4,441	103	.....
60,944	1,815	3,759	548	1,248	3,514	.....	.....	66	117	306	2,816	14,955	616	3,500
9,462	545	739	38	225	513	13	.....	17	8	93	477	2,493	.....	.....
6,827	207	203	.....	292	359	.....	.....	4	31	12	361	1,625	.....	.....
11,726	140	355	2	137	969	50	.....	5	16	6	.....	1,315	.....	.....
17,930	778	1,942	25	240	2,015	168	1,063	.....	33	335	976	2,482	.....	\$288
7,600	199	.....	382	129	413	.....	.....	25	.....	218	1,043	1,776	.....	.....
44,083	1,324	2,500	409	798	3,756	118	1,063	34	80	571	2,380	7,198	.....	288
2,695	124	6	.....	371	655	.....	13	.....	79	40	108	846	.....	.....
6,744	549	357	21	156	910	.....	.....	.....	24	39	193	1,600	566	.....
6,826	273	364	.....	157	1,660	.....	.....	25	228	205	.....	1,763	.....	.....
10,568	323	876	5	285	966	.....	.....	70	38	126	279	3,352	.....	.....
24,138	1,145	1,597	26	598	3,536	.....	.....	95	290	370	472	6,715	566	.....
3,278	176	41	3	146	747	.....	.....	10	43	43	121	987	.....	.....
2,902	330	200	.....	94	437	.....	100	19	.....	21	128	927	.....	.....
6,180	506	241	3	240	1,184	.....	100	29	43	64	249	1,914	.....	.....
34,713	935	792	625	607	403	90	.....	25	9	75	833	7,892	3,154	.....
1,784	118	.....	.....	46	133	.....	75	.....	10	6	136	500	.....	.....
6,416	130	595	7	286	591	.....	.....	46	33	98	369	1,217	.....	.....
6,404	584	83	.....	242	385	.....	132	.....	3	.....	273	4,033	.....	.....
4,518	306	.....	17	100	967	619	.....	11	13	.....	442	1,604	.....	.....
2,274	99	52	40	77	311	.....	.....	27	29	.....	187	635	.....	.....
5,903	208	.....	141	273	708	.....	.....	30	62	36	.....	1,411	.....	.....
3,916	153	.....	.....	71	527	.....	.....	1	8	.....	330	810	.....	800
65,928	2,533	1,522	830	1,702	4,025	709	207	140	167	215	2,620	18,102	3,154	800

* Including \$1,594 Memorial Relief Fund.
water commissioners.

+ Loan to manufacturers.

‡ Sewers.

§ To credit of

TABLE VIII. - FINANCIAL STATEMENT -

Village municipalities.	Disbursements. - <i>Continued.</i>						Assets.			
	School debentures redeemed.	All other debentures redeemed.	Refund of moneys borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
WELLINGTON :										
Arthur			1,800	1,133	403	8,241	313	1,062	3,562	150
Clifford					87	2,245	657	382		709
Drayton	325		5,100	204	578	9,440	347	303		
Elora		856		932	319	8,162	1,020	4,773		728
Erin			300	10	69	1,771	5			
Fergus		15,508	500	1,206	154	30,605	62	1,092		*2,278
Totals	325	16,364	7,700	3,485	1,610	60,464	2,404	7,612	3,562	3,865
WATERLOO :										
Ayr		292	292	745		5,259		220	3,640	
Elmira		300		435	20	3,484	360			500
Hespeler	567	165	6,805	638	5	14,822	221	490		
New Hamburg		779	500	557	107	12,397	1,733			3,550
Preston	648	1,266	7,992	1,467	287	21,165	1,503	169	2,427	7,000
Totals	1,215	2,802	15,589	3,842	419	57,127	3,817	879	6,067	11,000
DUFFERIN :										
Shelburne	256	350	2,600	451	619	9,437	25	2,804		
LINCOLN :										
Beamsville	136	210	2,405	807	73	6,725	102	353		
Grimsby		700	3,100	286	+4,645	11,726		113		
Meriton	352	1,693	577	3,359	278	16,504	1,426	439		288
Port Dalhousie		324	50	358	48	5,415	2,185	1,260		
Totals	488	2,927	6,582	4,810	5,044	40,370	3,713	2,168		288
WENTWORTH :										
Waterdown					32	2,269	426	571		
HALTON :										
Acton		360	400	815	202	6,192	552	531	1,778	
Burlington		230	1,500	158	43	6,606	220	156		2,000
Georgetown	200	550	439	2,607	271	10,387	181	553		
Totals	200	1,140	2,339	3,580	516	23,185	953	1,242	1,778	2,000
PEEL :										
Bolton		122	550	51	203	3,243	35			
Streetsville			150	3	22	2,431	471	222		
Totals		122	700	54	225	5,674	506	222		
YORK :										
East Toronto		902	15,015	3,336	20	34,713		16,313	13,175	
Holland Landing		100	400	46	33	1,603	181	242		
Markham	323	559		1,085	5	5,344	1,072	1,233		
Richmond Hill			250	33	174	6,192	212	53		860
Stouffville	130	160		115	34	4,518		373		
Sutton			300	12	205	1,974	300	41		
Weston	535	205		882	235	4,726	1,177	846		
Woodbridge	116			339	60	3,265	651	427		3,554
Totals	1,104	1,926	15,965	5,848	766	62,335	3,593	19,528	13,175	4,414

* \$1,034 Memorial Relief Fund.

† Cemetery lot and improvements.

VILLAGE MUNICIPALITIES.—Continued.

Assets.—Continued.					Liabilities.							
School lands and buildings.	Waterworks and electric light plant.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates.	Railway debentures.	School debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
9,000		500	87	14,674	487	225	5,000	5,000	8,500	*567	228	20,007
2,000		900		4,648								
5,600		3,225	154	9,629	277			1,512	800		100	2,689
6,000		12,400	108	25,029	588	1,825	7,000		7,841			17,254
3,000				3,005								
10,500		17,200	1,096	32,228		2,241			5,083	1,146	506	8,976
36,100		34,225	1,445	89,213	1,352	4,291	12,000	6,512	22,224	1,713	834	48,926
8,000		3,820		15,680				10,200	2,931	402		13,533
9,500		7800		11,160			8,400					8,400
14,210		11,345	132	26,448				5,753	3,748	1,000	226	10,727
8,300		7,600	239	21,372					8,915			8,915
15,000		10,604		36,703		1,880		8,350	18,094			28,324
55,010		34,169	421	111,363		1,880	8,400	24,303	33,688	1,402	226	69,899
4,000	12,438	11,734	124	31,125	639	730			14,730		487	16,586
6,000	15,000	765	45	22,265	383			1,352	12,390	1,058	214	15,397
2,000		5,100	1,503	8,716	867	300			3,200	252	961	5,580
14,625	73,100	13,259	682	103,819				8,691	56,434		486	65,611
5,000		900		9,345	195	1,827			6,676	500	260	9,458
27,625	88,100	20,024	2,230	144,145	1,445	2,127		10,043	78,700	1,810	1,921	96,046
5,500		1,000		7,497								
10,600		17,265		30,726				5,500	10,170			15,670
5,000	1,115	7,150	1,222	16,864	290				1,643			1,933
20,000	40,000	11,300		72,036				11,400	40,000			51,400
35,600	41,116	35,715	1,222	119,626	290			16,900	51,813			69,003
7,000		1,785	110	8,930		242			555			797
6,000		1,465		8,158		346					94	440
13,000		3,250	110	17,088		588			555		94	1,287
7,500	23,123	5,109	1,512	66,732		3,259			61,598	13,535	1,017	79,409
2,000		525	11	2,959	126				300	150	35	611
11,000	12,500	4,000	156	29,961				5,059	15,885		95	21,039
7,310		4,546		12,981				3,000				3,000
4,000	619		38	5,030				1,126	523	521		2,170
4,000		25	39	4,405							379	379
13,000		5,000		20,023	499	866		10,377	1,467		1	13,210
7,626		450	2,735	15,443				6,668		854		7,522
56,436	36,242	19,655	4,491	157,534	625	4,125		26,230	79,773	15,060	1,527	127,340

* Due Sinking Fund.

† Omitted from previous returns.

‡ Including \$5,910 due Sinking Fund

TABLE VIII.—FINANCIAL STATEMENT—

Village municipalities.	Receipts.										
	Balance from 1896.	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Water, gas and electric light rates.	Interest and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for other purposes.	Miscellaneous.
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
ONTARIO :											
Beaverton	607	2,946	194	24		243		500			127
Cannington		3,890	215	74				1,863			37
Port Perry		9,161	482	204				1,700			114
Totals	607	15,997	891	302		243		4,063			278
DURHAM :											
Millbrook		3,795	567	55				1,175			137
Newcastle	879	3,579	81	27					2,000		120
Totals	879	7,374	648	82				1,175	2,000		257
NORTHUMBERLAND :											
Brighton		5,917	125	150				2,000			35
Campbellford	4,565	13,314	597	20	1,353						247
Colborne	499	4,183	81	49				1,300			639
Hastings		3,817	249	37				1,500			* 2,000
Totals	5,064	27,231	1,052	256	1,353			4,800			2,921
PRINCE EDWARD :											
Wellington	761	1,726	153	37				500			
LENNOX AND ADDINGTON :											
Bath	287	2,055	58	45		70		150			
Newburg	170	2,913	75								
Totals	457	4,968	133	45		70		150			
FRONTENAC :											
Garden Island		1,514									
Portsmouth	795	1,629	71	1				200			
Totals	795	3,143	71	1				200			
LEEDS :											
Athens	830	3,650	88	8		4					7
Newboro'	338	1,789	130	41			200				127
Totals	1,168	5,439	218	49		4	200				134
GRENVILLE :											
Cardinal	72	3,518	330	209				400			147
Kemptville	2,231	6,754	471	62				1,700		5,000	42
Merrickville	345	4,851	346	39				700			
Totals	2,648	15,123	1,147	310				2,800		5,000	189
DUNDAS :											
Chesterville	99	2,823	261	89				990			16
Iroquois	2,302	5,038	320	265							7
Morrisburg	511	9,956	770	14	1,288			1,400			
Winchester	333	4,635	328	21				4,050			335
Totals	3,245	22,452	1,679	389	1,288			6,440			358

* Town Hall Insurance.

VILLAGE MUNICIPALITIES.—Continued;

Total receipts.	Disbursements.													
	Allowances, salaries and commissions.	Lighting of streets, water-supply and fire protection.	Law costs.	Other expenses of municipal government.	Streets, bridges and parks.	Waterworks, gas and electric light construction.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	Administration of Justice, including police service.	County treasurer for levies.	Payments on account of schools and education.	Sinking Fund investments and deposits.	All other investments and deposits, including
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
4,641	128	202	...	79	551	.....	.....	155	19	45	269	849	209	.....
6,079	167	553	...	323	613	.....	.....	15	36	32	375	1,750	.....	.....
11,661	302	676	.....	546	818	.....	.....	.....	230	6	1,066	3,624	.....	.....
22,381	597	1,431	.....	948	1,982	.....	.....	170	285	83	1,710	6,223	209	.....
5,729	153	636	.....	440	530	.....	.....	10	35	110	.....	400	.....	.....
6,686	269	23	47	157	745	.....	.....	40	97	55	260	4,085	.....	.....
12,415	423	659	47	597	1,275	.....	.....	50	132	165	260	4,485	.....	.....
8,227	318	495	4	385	954	.....	.....	24	111	9	423	3,000	.....	.....
20,096	407	1,143	38	314	2,534	.....	.....	49	94	615	650	4,558	.....	.....
6,751	145	829	.....	132	865	.....	.....	31	85	48	233	2,041	.....	.....
7,603	191	472	10	143	459	.....	2,952	10	104	125	243	1,173	.....	.....
42,677	1,091	2,939	52	974	4,812	.....	2,952	114	394	797	1,609	10,772	.....	.....
3,177	107	3	5	95	118	.....	.....	.....	58	7	440	734	.....	.....
2,665	122	.....	2	173	165	.....	.....	10	80	18	300	1,160	.....	.....
3,158	148	.....	.....	65	89	.....	.....	11	34	1	319	1,244	1,000	.....
5,823	270	.....	2	238	254	.....	.....	21	114	19	619	2,404	1,000	.....
1,514	25	.....	.....	15	8	.....	.....	3	.....	.....	325	830	.....	.....
2,696	367	.....	.....	188	155	.....	.....	10	85	82	575	1,135	.....	.....
4,210	392	.....	.....	203	163	.....	.....	13	85	82	900	1,965	.....	.....
4,587	129	131	.....	60	827	.....	.....	.....	47	.....	241	2,002	.....	.....
2,625	87	.....	.....	41	148	.....	.....	.....	.....	.....	123	983	200	.....
7,212	216	131	.....	101	975	.....	.....	.....	47	.....	364	2,985	200	.....
4,676	164	680	74	181	324	.....	25	2	31	239	186	1,564	.....	.....
16,260	221	622	140	183	573	*440	.....	15	102	27	398	3,200	.....	.....
6,281	160	309	.....	129	1,376	.....	.....	20	8	18	356	1,358	.....	.....
27,217	545	1,611	214	493	2,273	440	25	37	141	284	940	6,122	.....	.....
4,278	106	.....	45	68	799	.....	.....	.....	27	.....	142	1,505	.....	.....
7,932	96	281	31	388	965	.....	.....	5	153	201	492	1,959	.....	.....
13,939	262	1,404	.....	101	894	.....	.....	.....	192	74	743	4,800	.....	.....
9,702	140	10	9	145	1,067	*855	950	41	17	38	202	1,665	.....	.....
35,851	604	1,695	85	702	3,725	855	950	46	389	313	1,579	9,929	.....	.....

* For sewers.

TABLE VIII—FINANCIAL STATEMENT—

Village municipalities.	Disbursements—Continued.						Assets.			
	School debentures redeemed.	All other debentures redeemed.	Refund of moneys borrowed for current expenses.	Interest on loans, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
ONTARIO:										
Beaverton	275	200	400	375	86	3,842	799	749	1,518	1,500
Cannington		328	1,566	237	84	6,079		564		
Port Perry		1,310	1,095	1,726	78	11,477	184	2,411		
Totals	275	1,838	3,061	2,338	248	21,398	983	3,724	1,518	1,500
DURHAM:										
Millbrook	220		2,098	279	467	5,378	351	2,761		
Newcastle				2	33	5,813	873	187		
Totals	220		2,098	281	500	11,191	1,224	2,948		
NORTHUMBERLAND:										
Brighton			2,081	36	124	7,994	233			
Campbellford	788	1,305		1,992	449	14,936	5,160	2,361		
Colborne		600	1,300	95	72	6,636	217	638		
Hastings		380	719	68	99	7,148	455	188		
Totals	788	2,285	4,100	2,191	744	36,614	6,063	3,187		
PRINCE EDWARD:										
Wellington		125	850	31	13	2,586	591			
LENNOX AND ADDINGTON:										
Bath			150	6	10	2,196	469	274		2,000
Newburg				212		3,123	35	3,943	1,000	
Totals			150	218	10	5,319	504	4,217	1,000	2,000
FRONTENAC:										
Garden Island					308	1,514				
Portsmouth					83	2,680	16	2,488		
Totals					391	4,194	16	2,488		
LEEDS:										
Athens					496	3,933	654	105		
Newboro'	116			293	20	2,011	614	219	1,944	
Totals	116			293	516	5,944	1,268	324	1,944	
GRENVILLE:										
Kardinal	147	150	400	198	124	4,489	187	191		
Kemptville	2,605		1,100	573	*5,239	15,138	822	1,839		
Merrickville		500	1,500	344	94	6,172	109	3,103		
Totals	5,752	650	3,000	1,115	5,457	26,099	1,118	5,133		
DUNDAS:										
Chesterville			871	49	398	4,010	268			
Iroquois	542	250		444	188	5,995	1,937	2,012		
Morrisburg	602	823	1,400	1,679	163	13,137	802	56		
Winchester	576	119	2,375	648	360	9,217	485	94		
Totals	1,720	1,192	4,646	2,820	1,109	32,359	3,492	2,162		

* Including \$5,000 bonus to Kemptville Milling Co.

VILLAGE MUNICIPALITIES.—Continued.

Assets.—Continued.					Liabilities.							
School lands and buildings.	Waterworks and electric light plant.	Other property.	Miscellaneous.	Total assets.	County levy.	Local school rates	Railway debentures	School debentures	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
5,000		675	8,150	18,831		849	1,000	1,375	3,500	1,600		8,324
4,100		7,585	145	12,834					3,795	463		4,258
12,009		13,560	20	28,175					37,690	3,675	30	41,595
21,100		21,820	2,315	58,960		849	1,000	1,375	44,985	5,738	30	53,977
5,750		6,970	1,083	16,915	234	858		4,171		1,007	25	6,295
6,000		3,000		10,060				2,000				2,000
11,750		9,970	1,083	26,975	234	858		6,171		1,007	25	8,295
6,000	140	8,820		15,193								
25,000	22,500	5,895	2,231	63,147				12,352	24,639		997	37,988
7,000		390	525	8,768					1,300			1,300
		7,800		8,443			377			1,500		1,877
38,000	22,640	22,905	2,756	95,551			377	12,352	25,939	1,500	997	41,165
4,000		1,000		5,591			250			810		1,060
4,000		1,700	15	8,458	300	225						525
4,000		100		9,078	319	2,006	5,000					7,325
8,000		1,800	15	17,536	619	2,231	5,000					7,850
2,500		3,000		8,004	575	906				203	133	1,817
2,500		3,000		8,004	575	906				203	133	1,817
3,500		504	18	4,781							2,239	2,239
3,500		1,180	72	7,529			4,000	1,577				5,577
7,000		1,684	90	12,310			4,000	1,577			2,239	7,816
7,000		3,500	\$971	11,849	190	50		3,332				3,572
18,000		8,900	5,000	34,561	406	1,000		4,120	5,000	600	249	11,375
5,000		1,500		9,712	363	175	5,700		300		266	6,804
30,000		13,900	5,971	56,122	959	1,225	5,700	7,452	5,300	600	515	21,751
2,000		915	127	3,310						289	557	846
19,000		5,500		28,449	403	1,952		5,583	2,500		25	10,473
32,000	31,500	3,630	1,286	69,274				6,130	24,954		56	31,140
12,900		2,500	2,839	18,818				9,613	1,381	2,335	721	14,050
65,900	31,500	12,545	4,252	119,851	403	1,952		21,326	28,835	2,624	1,369	56,509

* Including \$7,790 share of G. T. R. Bonus held by Tp. ; also \$360 Thorah's share of School debentures
† Including \$1,100 due Sinking Fund.
‡ Share of debenture debt of Yonge and Escott Rear.
§ Edwardsburg share of School Deb debt. || Mortgage on premises, Kemptville Milling Company.
a Including stone crusher, \$700 ; road machine, \$250, not previously reported.

TABLE VIII.—FINANCIAL STATEMENT.

Village municipalities.	Receipts.										
	Balance from 1896	Municipal and school taxes.	Licenses.	Fees, rents, fines, etc.	Water, gas and electric light rates.	Interest and dividends.	Refund of money invested.	Borrowed for current expenses.	Borrowed on debentures for schools.	Borrowed on debentures for other purposes.	Miscellaneous.
	¢	\$	¢	¢	¢	¢	¢	¢	¢	¢	¢
GLENGARRY :											
Alexandria	125	6,558	422	22	1,093			7,200		6,000	602
Lancaster	56	1,021	280	29				243			
Maxville	121	1,185		5							
Totals	302	8,764	702	56	1,093			7,443		6,000	608
PRESCOTT :											
L'Original	618	2,273	91			178	6,635				
RUSSELL :											
*Casselman		*1,889	*100					300			†1,000
Rockland	261	945	196	45				125			
Totals	261	2,834	296	45				425			1,000
CARLETON :											
Hintonburg	664	10,521	26	35		40				8,000	350
Ottawa East	1,167	2,113	64	18		44			1,200		150
Richmond		1,772	26			18		200		1,500	42
Totals	1,831	14,406	116	43		102		200	1,200	9,500	542
RENFREW :											
Eganville	819	3,876	341								104
LANARK :											
Lanark	486	4,009	203	76		2		700			32
VICTORIA :											
Bobcaygeon	2,081	4,681	222	135		36					1,085
Fenelon Falls	137	5,285	325	65		116					63
Omamee	134	1,822	225	48				730			533
Woodville	739	1,324	134	42				200			801
Totals	3,091	13,112	906	290		152		930			2,482
PETERBOROUGH :											
Ashburnham	233	8,749	561	250				6,300			48
Havelock	195	3,696	353					600			
Lakefield	216	4,844	503	136		118		2,450			87
Norwood	469	6,429	317	9		143		950			116
Totals	1,113	23,718	1,734	395		261		10,300			251
HASTINGS :											
Madoc		6,066	458	43		72		16			90
Stirling		2,856	167	1							168
Tweed	1,384	2,821	325	3				200			97
Totals	1,384	11,743	950	47		72		216			355
MUSKOKA :											
Huntsville	7,245	7,790	526	80	956			13,000		25,000	2,150
Port Carling		406	56	25							77
Totals	7,245	8,196	582	105	956			13,000		25,000	2,227
PARRY SOUND :											
Burk's Falls	203	2,815	108	4		16		1,500			658
Sundridge		1,786	47	1				1,000			471
Totals	203	4,601	155	5		16		2,500			1,129

* Casselman fire of Oct. 5th, 1897 destroyed all records. The Treasurer reports a balance in Jan., 1898 of \$224. † Grant from County for sufferers from fire, per Co. Auditors' report.

VILLAGE MUNICIPALITIES.—Continued.

Total receipts.	Disbursements.													
	All-wages, salaries and commissions.	Lighting of streets, water supply and fire protection.	Law costs.	Other expenses of municipal government.	Streets, bridges and parks.	Waterworks, gas and electric light construction.	Buildings and other works.	Board of Health.	Support of the poor and other charities.	Administration of justice, including police service.	County treasurer for levies.	Payment on account of schools and education.	Sinking Fund investments and deposits.	Other investments and deposits.
\$	%	%	%	%	%	%	%	%	%	%	%	%	%	%
22,022	173	2,033	...	285	588	2,380	1,650	58	32	10	157	2,284	...	...
1,629	100	102	2	50	255	...	...	4	56	10	124	874	...	...
1,317	61	17	17	102	127	*189	...	...	4	6	62	630	...	...
24,968	334	2,152	19	437	970	2,569	1,650	62	92	26	343	3,788	...	...
9,795	236	2	15	22	526	...	...	3	19	5	280	1,472	561	...
3,289	155	...	...	40	412	...	...	25	12	...	...	741	...	...
1,572	96	...	...	11	250	...	...	38	2	18	171	160	...	...
4,861	251	...	...	51	662	...	...	63	14	18	171	901	...	...
19,626	832	440	2,028	947	4,127	...	63	91	16	118	...	3,174	374	...
4,756	130	...	...	88	386	*68	228	22	...	26	108	3,050	...	...
3,568	210	...	8	127	505	...	647	...	...	...	100	1,237	193	126
27,940	1,172	440	2,036	1,162	5,018	68	938	113	16	144	208	7,461	567	126
5,140	236	290	...	65	459	...	...	56	7	...	870	1,938	...	...
5,508	218	480	...	116	517	...	...	...	84	300	288	1,547	...	...
8,240	140	130	...	198	740	...	82	69	48	315	247	1,821	471	...
5,991	558	252	13	286	762	...	...	43	83	206	340	2,331	316	...
3,492	178	67	7	147	247	...	...	10	22	56	227	1,520	...	...
3,240	186	15	...	47	614	...	...	...	16	2	117	1,640	...	...
20,963	1,012	464	20	678	2,363	...	82	122	169	579	931	7,312	787	...
16,141	484	1,208	54	183	1,712	...	550	...	169	144	869	2,639	...	...
4,844	193	160	15	76	1,033	...	...	38	10	...	120	1,622	...	...
8,354	344	508	35	148	1,139	...	...	27	74	166	493	1,618	394	...
8,433	222	518	612	100	700	...	...	25	12	4	474	4,148	305	...
37,772	1,243	2,394	716	507	4,584	...	550	90	265	314	1,956	10,027	699	...
6,745	317	130	9	85	598	*73	...	20	45	141	617	2,047	316	...
3,192	136	12	...	100	477	...	...	...	181	...	513	...	300	...
4,830	304	351	5	146	504	...	...	10	12	54	399	1,418	...	...
14,767	757	493	14	331	1,579	73	...	30	238	195	1,529	3,465	616	...
56,747	806	2,517	110	394	1,135	23,076	...	16	133	...	...	2,044	...	...
64	76	...	9	19	82	...	...	20	11	...	...	190	...	...
57,311	882	2,517	119	413	1,217	23,076	...	36	146	...	...	2,234	...	...
5,304	213	377	14	148	599	...	...	35	25	19	...	1,300	62	...
3,305	111	...	...	221	187	...	244	22	11	10	...	732	...	...
8,609	324	377	14	369	786	...	244	57	36	29	...	2,032	62	...

* Sewers.

TABLE VIII.—FINANCIAL STATEMENT.

Village municipalities.	Disbursements.—Continued						Assets.			
	School debentures redeemed.	All other debentures redeemed.	Refund of money* borrowed for current expenses	Interest on loan, advances and debentures.	Miscellaneous.	Total disbursements.	Cash in treasury.	Taxes in arrears.	Sinking Fund investments and deposits.	All other investments and deposits.
	%	%	\$	%	%	%	%	%		%
GLENGARRY :										
Alexandria	148	529	9,500	1,988	149	21,964	58	5,481		
Lancaster					52	1,629		1,140		
Maxville			30	2	29	1,282	3	128		
Totals	148	529	9,530	1,996	230	24,875	93	6,749		
PRESCOTT :										
L'Original	6,200			372	24	9,737	58	493		
RUSSELL :										
Casselman		300		*138	†1,242	3,067	224	1,475		
Rockland			625	72		1,443	129	2,955		
Totals		300	625	210	1,242	4,508	353	4,430		
CARLETON :										
Hintonburg				210	425	12,845	6,781	5,813	803	
Ottawa East	100	83		199		4,488	268	1,315		500
Richmond				100	30	3,283	276	1,468	684	126
Totals	100	83		509	455	20,616	7,324	8,596	1,487	626
RENFREW :										
Eganville	87	233	600	106	22	4,969	171	1,682		
LANARK :										
Lanark	234		700	223	328	5,025	473	18		
VICTORIA :										
Bobcaygeon				300	79	4,640	3,600	542	3,692	
Fenelon Falls			300	182	101	5,773	218	3,234	3,000	
Omenee			730	31	90	3,332	160	37		
Woodville			400	31	92	3,110	130	210		
Totals			1,430	544	362	16,855	4,108	4,021	6,692	
PETERBOROUGH :										
Ashburnham		87	7,200	675	71	16,045	96	1,472		
Havelock			1,242	27	246	4,782	62	219		
Lakefield			2,450	562	173	8,131	223	119	3,162	
Norwood	115		546	585	66	8,432	1	1,156	3,887	
Totals	115	87	11,438	1,849	556	37,390	382	2,966	7,049	
HASTINGS :										
Madoc	358		181	847	961	6,745		5,727	5,858	
Stirling			605		63	2,387	805	2,246	300	
Tweed		247	200	393	10	4,053	777	1,939		5,000
Totals	358	247	986	1,240	1,034	13,185	1,582	9,912	6,158	5,000
MUSKOKA :										
Huntsville	460	452	23,000	1,848	373	56,566	381	1,462		100
Port Carling			20		10	437	127	543		
Totals	460	452	23,020	1,848	383	56,803	508	2,005		100
PARRY SOUND :										
Burk's Falls	159		1,400	431	219	5,001	303	418	382	
Sundridge			657	339	514	3,048	257	1,506		5,000
Totals	159		2,057	770	733	8,049	560	1,924	382	5,000

* Estimated; no returns owing to loss of village records by fire.

† Sundries—estimated expenditure re fire losses.

VILLAGE MUNICIPALITIES.—Continued.

Assets.—Continued.					Liabilities.							
School lands and buildings.	Waterworks and electric light plant.	Other property.	Miscellaneous.	Total assets.	County levy.	Local School rates.	Railway debentures.	School debentures.	All other debentures.	Loans for current expenses and interest.	Miscellaneous.	Total liabilities.
£	£	£	£	£	£	£	£	£	£	£	£	£
32,000	35,500	2,050	800	75,889	227	1,920		3,607	33,125	3,700	1,000	43,579
		715		1,855		741				243	30	1,014
1,200				1,363						100		100
33,200	35,500	2,765	800	79,107	227	2,661		3,607	33,125	4,043	1,030	44,693
				551	127						15	142
500		250		2,449	166	880			1,700	944		3,690
12,000		1,000		16,084	213	1,860				535	195	2,803
12,500		1,250		18,533	379	2,740			1,700	1,479	195	6,493
9,000		4,900	673	27,970	270	2,733			11,500	6,397	2,943	23,843
4,500		3,652		10,235	189			2,500	2,337		80	5,106
2,500		1,400		6,453	456	303		2,000	1,500			4,259
16,000		9,952	673	44,658	915	3,036		4,500	15,337	6,397	3,023	33,208
1,325		3,140	149	6,467		849		552	1,079			2,480
7,000		6,500		13,991				3,911				3,911
6,000		5,187		19,021	298	1,200		3,000	3,000		5	7,503
5,000		2,320	430	14,202	429	1,607		3,000		829	175	6,040
3,600		900		4,695								
1,900		1,050		3,290	205						427	632
16,500		9,457	430	41,208	932	2,807		6,000	3,000	829	607	14,175
9,000		6,895	50	17,513	810			2,500	5,001	2,500	130	10,941
2,200		71	76	2,628							1,830	1,830
6,000		9,500	100	19,104	459				10,000		100	10,559
16,000		3,670	1,886	26,600	442			10,220		636	179	11,477
33,200		20,136	2,112	65,845	1,711			12,720	15,001	3,136	2,239	34,867
15,500		3,200		30,285	702			12,832		4,456	4,390	22,380
9,000		3,300		15,651	578	2,107		4,300			459	7,444
3,450		4,000		15,166	454	1,671			6,581		237	8,943
27,950		10,500		61,102	1,734	3,778		17,132	6,581	4,456	5,086	38,767
6,000	32,671	1,077	66	41,757		2,400		3,550	24,548	7,913		38,411
			16	686		226					833	1,059
6,000	32,671	1,077	82	42,443		2,626		3,550	24,548	7,913	833	39,470
4,417		141	1,093	6,757		1,200		4,690	2,000	500	20	8,410
1,106		235		8,098		502			5,000	1,392	40	6,934
5,514		379	1,093	14,855		1,702		4,690	7,000	1,892	60	15,944

* Including \$2,383, share of Nepean Tp. School debenture debt. † Including \$4,410 due Sinking Fund.
 ‡ Including \$600 due Medora and Wood Tp. on School debentures.

FINANCIAL STATEMENT-CITY MUNICIPALITIES.

TABLE IX. Showing an abstract statement of Receipts, Disbursements, Assets and Liabilities of the Cities of Ontario for the year ending Dec. 31, 1897.

Schedule.	Belleville.	Brantford.	Chatham.	Guelph.	Hamilton.	Kingsdon.	London.	Ottawa.	St. Catharines.	St. Thomas.	Stratford.	Toronto.	Windsor.
RECEIPTS.													
Balance from 1896	129	3,072	876	840	4,758	7,049	*133,531	465,451	8,957	4,763	18,397	531,425	1,563
Municipal and school taxes	85,196	124,110	79,301	95,349	513,868	130,278	369,634	16,253	96,297	90,485	79,672	2,683,906	152,465
Quorum licenses	4,127	2,941	3,808	2,363	10,471	7,597	2,723	16,253	2,093	3,329	3,318	32,887	4,039
Other licenses	1,056	1,927	672	391	4,482	1,187	2,549	3,303	1,124	717	591	22,886	816
Fees, rents, tolls, fines, etc	4,057	3,671	1,639	3,814	38,587	4,541	21,065	29,947	3,863	1,167	1,547	271,465	3,328
Water rates, electric light rates, etc	1,80	2,752	13,732	13,669	171,318	29,606	68,055	171,934	21,342	13,236	17,431	459,381	34,039
Interest on investments, and dividends		8,185	1,618	8,578	7,878	3,838	16,395	68,375	2,972	3,460	2,904	175,581	8,047
From Gov't (except for loans and schools)				225	10,610		270		225			7,288	
Refund of moneys loaned or invested	29,000	17,913	5,079	51,215	73,578	5,980	171,091	11,964	430,342	2,465	1,100	1,226,966	35,389
Loans:													
Money borrowed for current expenses	6,371		3,152		123,069	46,279	374,674	338,411	55,096	174,200	129,000	431,235	177,701
Money borrowed on debentures	32,961	31,401	174,633	43,439	36,010	82,626	83,279	297,717		31,682	7,457	1,608,546	83,004
Cemetery		1,003	596		2,636				1,089		1,157		
Miscellaneous	2,801	36,654	4,110	3,475	15,265	418,794	7,546	37,130	2,486	590	7,166	153,579	3,686
Totals	167,568	258,642	288,216	223,358	1,012,675	3,7824	1,250,822	1,450,485	228,885	328,124	253,312	7,607,715	504,667
DISBURSEMENTS.													
<i>Expenses of municipal government:</i>													
Election of members of council	206	296	158	331	932	660	648	693	88	272	177	5,158	418
Allowances, salaries and commissions	4,755	1,372	4,415	4,155	26,902	6,872	17,251	24,975	5,281	4,466	3,227	78,732	4,515
Printing, advertising, postage, stationery	466	1,797	1,324	801	1,976	2,659	3,861	6,169	618	1,316	755	13,484	1,342
Insurance, heating, lighting and care of buildings	1,357	2,430	700	2,079	4,665	3,169	4,416	6,855	1,155	301	2,414	15,814	719
Law costs (including salaries)		380	1,632	988	4,626	3,065	2,423	12,864	1,226	69	590	34,070	2,529
Lighting of streets	6,888	6,762	4,464	6,186	31,564	7,571	24,380	27,178	7,146	5,325	5,079	103,128	6,785
Water supply and fire protection	12,181	29,526	17,348	12,240	83,125	19,683	49,187	86,332	20,770	13,274	8,243	345,450	22,735
Other expenses of municipal government	2,401	790	1,408		12,265	1,353	4,559	4,165	996	1,932	428	36,084	1,747
<i>Construction works:</i>													
Streets, bridges and parks	9,450	17,367	35,506	18,578	97,078	22,542	56,861	332,118	21,139	13,909	13,674	748,457	12,192
Waterworks, sewers, electric light plant	1,429	4,773	39,943		53,205	27,706	77,595	47,235	3,571	3,233	11,468	72,697	31,071
Buildings and other property	711	2,783			61,833	17,000	560	84,735			2,703	377,663	7,833
Board of Health (including salaries)	613	567	879	639	9,010	898	2,139	11,326	431	490	605	38,804	1,074
Support of the poor and other charities	1,625	6,116	2,462	3,498	41,928	3,960	14,679	2,006	3,003	3,162	2,463	87,041	3,884
Administration of justice, police service	9,871	7,031	6,706	7,174	14,600	14,600	35,086	42,194	5,420	5,166	4,204	301,275	7,702
Payments on acc't of schools and education	17,896	39,694	19,300	23,149	112,845	41,283	97,412	148,172	23,312	19,851	22,300	475,099	29,496
Sinking Fund investments and deposits	6,372	27,419		64,917	46,735	11,480	217,716	130,777	4,701	4,473	8,224	1,525,389	30,355

Loans and interest :															
		(Principal													
Debentures redeemed.....		Interest													
8	Interest or discount on loans, etc.....	20,919	38,342	23,752	30,589	52,246	36,631	18,313	12,364	16,960	24,419	1,100	1,754,767	76,398	
	Discount on debentures sold.....	3,043	817	5,799	1,193	6,476	4,036	4,442	31,400	2,051	2,039	2,636	32,058	4,879	
	Refund of moneys borrowed for current expenses.....							1,363						2,262	
	605														
8	Cemetery.....		1,470	759	14,000	122,330	33,338	336,059	184,529	51,300	182,700	122,000		203,822	
	Library.....	100	2,700	1,144	1,788	8,804	300	8,363		1,552	750	1,137			
	Miscellaneous.....	856	4,446	9,245	2,777	10,112	\$34,083	118,232	5,748	2,010	3,349	1,026	29,650	1,975	
	Totals.....	167,170	255,915	284,956	211,802	1,007,196	334,167	1,219,480	1,430,485	225,462	320,214	239,099	7,102,304	503,092	
ASSETS.															
Cash in treasury (exclusive of sinking fund)															
	Taxes in arrears.....	338	2,727	3,260	11,556	5,479	3,667	31,342		3,423	7,910	13,213	505,411	1,575	
	Sinking Fund investments and deposits.....	53,863	4,154	25,483	13,821	371,653	55,316	50,238	552,300	41,943	12,283	24,393	948,280	51,462	
	Other investments (including special deposits).....	22,978	162,653		112,865	153,226	22,395	236,148	1,121,720	11,268	78,429	54,385	5,217,406	188,368	
	Land, buildings, library, etc.....	61,596	121,830	11,103	193,000	129,249	21,900	1,016,826	47,269	180,473	4,290	6,000	487	1,371	
	School property (including equipment).....	97,435	203,198	106,500	119,710	809,961	239,849	431,375	400,820	112,771	48,726	36,587	9,798,185	36,650	
	Waterworks.....	90,000	124,850	125,000	107,800	613,030	115,012	278,470	271,200	63,941	48,700	89,000	1,909,586	173,400	
	Other property (cemetery, fire halls, etc.).....		247,626	170,000	144,950	1,698,004	330,514	757,352	2,000,000	383,655	150,000		4,349,385	250,000	
	Miscellaneous.....		29,321	132,500	8,000	47,966,768	30,504	14,750	126,000	45,730	10,700	24,000	299,773	43,000	
	Totals.....	29,307	6217,165	57,222	55,529	151,179	28,050	89,000	509,829	107,839	47,624	2,498	2,165,916	212,049	
	Totals.....	355,577	1,119,524	521,068	767,231	4,728,539	847,228	2,905,591	5,032,138	951,043	408,062	250,076	25,194,429	957,875	
LIABILITIES.															
Local school rates unpaid															
Debentures outstanding (principal):															
Aid to railways.....															
	Schools.....	8,500	59,893	15,700	271,289	71,090	143,098	325,000	145,000	119,697	14,227	60,000	1,143,718		
	Local improvement.....	17,664	164,336	64,979	466,206	47,225	112,233	210,566	446,929	534	185,955	30,871	7,594,276	99,136	
	Municipal works.....	408,000	421,433	289,190	289,190	424,930	300	2,111,063	316,700	622,075	182,618	288,500	7,072,467	297,696	
	Loans for current expenses.....	63,000	111,342	27,000	123,069	46,357	79,074	696,851	7,134	27,300	7,134	27,300	431,235	55,048	
	Miscellaneous.....	337	9,420	2,600	4,929	11,828	23,466	64,182	53,657	3,389	2,950	8,022	1,414,080	8,420	
	Totals.....	497,501	935,082	652,604	631,441	3,755,474	994,249	2,698,340	4,758,119	900,868	512,537	442,893	23,474,329	918,994	

* Including \$599 from former village of London West at time of amalgamation.
 † Including \$12,000 deposited by Elevator Company.

‡ Including \$10,289 at credit of Waterworks Commissioners in 1896.

§ Including \$25,000 bonus to Elevator Company, and \$5,019 refunds of guarantee deposits.

|| Omitting \$37,243 belonging to School Board investments, but previously reported as City municipal investments.

ℳ Including \$30,000 for sewers. ¶ Including \$13,000 for electric plant. a Including \$730,610 for sewage disposal system.

b Including \$9,176 assumed from former village of London West at time of amalgamation with city.

d \$1,000 transferred from "All other" to Local Improvement Debentures.

FINANCIAL STATEMENT—

TABLE X. Showing abstract statement of Receipts, Disbursements, Assets and Liabilities

Counties.	Receipts.											
	Balance from 1896.	Rates from local municipalities.	Licenses.	Fees, rents, tolls, fines, etc	Surplus fees from Registrar.	Interest and dividends.	Received from Government for—			Refund of moneys loaned or invested.	Money borrowed for current expenses.	Money borrowed on debentures.
							Schools.	Administration of justice.	Other purposes (except loans.)			
	£	£	£	£	£	£	£	£	£	£	£	£
Essex	1,782	28,105	160	183	1,417	75	3,923	6,740			10,000	10,000
Kent	3,172	45,296	285	40	859	68	4,746	12,163			51,000	
Elgin	2,957	31,490	384	6	387	a1,163	3,620	2,923			41,000	
Norfolk		21,192	103	197		56	2,923	1,990			11,000	
Haldimand	554	19,256	80	110		2	2,011	1,679				
Welland	191	23,651	267		617		2,352	3,875			13,137	
Lambton	3,464	25,026	117		1,418	178	4,699	4,752	b4,000		5,000	
Huron	1,317	53,108	823	111	735	548	6,672	3,972		6,516	31,000	
Bruce	5,237	31,479	505	174	1,315	455	5,757	3,888		22,000		
Grey	1	39,529	564	90	659	428	7,152	4,172				
Simcoe	3,612	61,000	859	d962	1,904	104	7,393	d17,489			d145,875	
Middlesex	26,809	62,398	310	76	172	2,499	6,101	6,639		1,352		e52,000
Oxford	13,953	40,682	420		855	283	4,112	4,673				
Brant	7,001	13,519	135	202	38	64	1,977	3,585			14,000	
Perth	8,403	46,302	172	5	8	94	3,800	3,706	b4,000		18,300	15,000
Wellington	10,205	47,478	374	172	48	327	4,564	4,378			23,000	
Waterloo	378	30,496	300	63	187	5	2,940	2,461			26,000	
Dufferin	379	21,303	343	399	158	418	2,539	3,095		1,000	7,500	
Lincoln	2,023	25,731	415	5	225	178	1,747	3,508				
Wentworth	43,968	12,000	153	2,487	334	1,360	3,160	6,211				
Halton	5,603	9,463	194	80		102	1,809	2,799			1,181	
Peel	1,368	16,000	250	39			2,816	2,688			11,000	
York		39,086	430	2,928		416	5,338	21,743			34,826	20,000
Ontario	13,865	20,500	219	42	228		3,973	3,174			54,000	
Northumberland and Durham	7,320	39,220	560	2	36		6,005	3,568			40,000	
Prince Edward		13,909	200	38		8	1,854	2,068			3,672	
Lennox and Addington	6,662	24,750	264	99		229	2,705	2,041	4			
Frontenac	26,603	33,715	115	2,711		240	3,687	2,003			20,000	20,000
Leeds and Grenville	69	29,363	195	17		595	4,759	2,764			4,379	
Stormont, Dundas and Glengarry	149	30,871	904	154	5	114	6,151	2,638			5,500	f5
Prescott and Russell	1,246	14,084	148	160		225	2,372	818			22,029	
Carleton	13,051	12,090	421	334	391	1,254	3,017	5,702			324	
Renfrew	2,721	20,966	442		279	211	6,025	2,905	88			
Larark	3,116	16,442	150	2		10	3,432	2,372			6,500	
Victoria	381	26,222	544	259			3,150	3,396			21,000	
Peterborough	4,040	19,138	354	82	69	260	3,008	2,882	12	1,386	7,576	
Haliburton	415	3,247	9	31			3,275	150			7,500	
Hastings	638	49,582	210	194	918	4,132	4,601	5,933	40	3,276	36,668	

a. Including \$1,126 on County rates. b. For House of Refuge.

c. Including \$3,807 allowed on county rate and non-resident tax adjustments.

d. Including sundry omissions of receipts by late County Treasurer, J. S. Sandford, during his term of office ended June 16th, 1897.

e. Including \$7,000 bought in by County as Sinking Fund investment.

f. Portion of debentures of 1896 to cover interest on cash value received for terms of 12, 10 and months respectively during 1896-7.

COUNTY MUNICIPALITIES.

of the county municipalities of Ontario for the year ending December 31st, 1897.

Receipts.—Continued.				Disbursements.									
Non-resident taxes collected.	Towns or cities separated from county, for various services.	Miscellaneous.	Total.	Expenses of municipal government.							Construction.		
				Attendance at meetings of council and committees.	Allowances, salaries and commissions.	Printing, advertising, postage and stationery.	Insurance, heating, lighting and care of buildings.	Law costs (including salaries.)	Other expenses.	Roads and bridges.	Grants to local municipalities for roads and bridges.	Buildings and other works.	
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	1	\$	\$	
7,453	6,339	2,604	78,781	841	2,913	1,494	763	514	507	3,603		448	
4,930	10,163	1,010	133,732	1,926	2,098	417	1,214	213	754	90		56	
743	5,900	394	90,967	531	2,338	703	1,240	369	38	5,235		676	
1,127		407	38,995	669	1,315	421	658		942	102			
249		127	24,068	707	1,213	287	657		337	1,358			
608	1,628	956	47,282	981	1,420	293	1,004	8	1,070	435	100	338	
13,551		1,178	63,383	914	2,551	783	1,097		760	505		914	
456		330	105,588	974	3,102	1,016	916		95	6,204	3,000	644	
3,071		530	74,439	1,555	2,494	1,023	1,483	280	78	7,470	2,966		
2,261		293	55,149	1,106	1,975	393	1,573		801	746	3,302	690	
4,531		a43,751	287,480	5,435	3,570	838	1,108		824	6,142		356	
2,898	5,864	5,004	172,122	1,109	4,337	880	639		276	2,793	6173		
239		806	66,024	1,740	2,921	714	433	27	218	1,613		103	
354	4,073	c6,400	51,348	802	1,449	1,423	813	410	103	120			
198		d4,810	104,798	631	1,724	279	549	72	192	1,017	4,196	3,323	
299	3,395	296	94,536	1,581	2,023	511	956	153	12	16,233	3,935	5,426	
550		138	63,518	997	1,401	1,004	1,936	42	476	1,185		133	
2,033			39,167	456	1,086	300	538	121	74	291		1,050	
731	3,018	703	38,284	687	1,569	267	272	95	1,319	2,188		675	
252	9,478	66	79,409	1,940	2,325	693	323	1,189		5,101	200		
151		26	21,408	136	1,035	553	780		415	224			
170		e3,078	36,909	358	1,141	622	906		229	1,494	149		
18,164	25,626	f17,435	185,992	2,743	3,207	992	1,755	1,064	5,557	13,182	200	4,637	
709		234	96,944	546	1,724	1,236	790	51	340	458	461		
662		83	97,456	3,360	1,910	1,319	595	120	2,888	16,244	230		
67			21,816	165	620	420	670		244	6	50		
7		337	37,098	565	983	819	960	74	507	65			
1,102	4,405	103	114,684	652	1,984	273	789	160	183	1,939	64		
171	2,979	859	46,150	1,164	2,075	311	857		848	202		369	
895			47,897	723	1,800	539	1,763	12	475	18			
4,933		861	46,876	687	765	721	575		354	722			
1,748	7,014	202	45,558	1,578	2,525	495	91	1,134	518	1,821	650	3,271	
335		123	34,095	830	1,440	544	1,097	18	572	811			
1,257		151	33,442	693	1,471	1,011	1,412		252	176			
1,461		2,842	59,255	1,321	2,308	986	508	47	866	3,499		1,102	
1,374	2,025	789	42,995	805	1,747	866	50	46	74	5,545	525		
682		69	15,378	248	689	235	66			6			
803	5,360	511	112,866	1,347	3,260	777	612	234	300	16,342	5,953		

a Including sundry omissions of receipts by late County Treasurer, J. S. Sandford, to June 10th, 1897.

b Including \$69 paid to County of Elgin.

c Including \$6,332 from estate of late county treasurer.

d Including \$4,467 receipts re House of Refuge, as follows:—Legacy of William Byers, \$2,648; legacy of Catharine Kneith, \$870; from townships and products, \$949.

e Including \$2,952, being Jane Porter's legacy to the House of Refuge.

f Including \$15,710, comprised as follows:—Bal. to credit of non-resident tax account (1896), \$8,393; refund of York Tp. re debenture debt, \$3,657; Jane Porter's legacy to Industrial Home, \$1,500; sale of house and lot, \$1,365; House of Industry, \$795.

FINANCIAL STATEMENT—

Counties.	Disbursements.—Continued.										
	Support of the poor and other charities.	Administration of justice, gaol maintenance, etc.	Grants to schools and other payments on education.	Sinking Fund and other investments, special deposits, etc.	Debentures redeemed.	Interest paid on debentures.	Refund of money borrowed for current expenses.	Interest and discount on loans and advances.	Non-resident taxes paid local municipalities.	Miscellaneous.	Total.
	%	\$	%	%	%	%	%	%	%	\$	\$
Essex	328	15,635	10,585		537	640	21,500	742	9,862	3,932	74,337
Kent	100	16,864	11,186		18,647	2,778	63,000	819	4,236	609	125,514
Elgin	5,279	11,148	9,664		1,252	693	38,500	992	702	375	79,732
Norfolk	4,523	7,479	8,524				11,017	329	1,289	91	37,359
Haldimand	189	8,253	9,069				450	326	102	366	23,314
Welland	4,796	10,191	7,804		1,678	265	15,154	237	608	415	46,857
Lambton	2,886	11,864	13,625		559	619	7,000	7	11,198	3,007	58,289
Huron	5,718	10,961	14,831			2,935	42,716	567	639	776	102,060
Bruce	420	11,306	12,385	a18,000				11	3,067	2,995	65,533
Grey	200	17,286	14,219	7,365		1,100		21	2,474	1,897	55,148
Simcoe	1,676	19,224	14,766	a4,000	16,800	1,764	120,000	3,334	4,497	d69,005	273,339
Middlesex	9,694	21,596	13,783	11,321	40,000	24,814			2,061	250	133,706
Oxford	4,613	14,148	9,255		5,355	5,550		141	411	330	48,072
Braut	1,412	10,924	4,434		3,209	1,201	14,000	200	495	1,059	42,054
Perth	4,505	9,285	9,121			8,600	53,300	551	314	506	98,165
Wellington	9,272	12,675	9,849		10,000	527	10,000		669	1,790	85,612
Waterloo	7,984	9,363	9,384		1,119	1,089	25,000	749	550	396	62,808
Dufferin	66	8,988	5,275	1,583	2,200	2,022	12,500	189	1,458	333	38,620
Lincoln	3,395	9,631	6,348		3,161	762	2,000	345	729	974	34,417
Wentworth	925	16,335	6,868	9,185	7,000	870		38	220	2,905	56,117
Halton	100	6,435	4,265				1,181	19	151	1,207	16,501
Peel		8,692	6,083				11,000	356	170	803	32,003
York	6,645	54,563	11,954	e6,321	4,223	2,040	44,011	1,644	20,236	1,018	185,992
Ontario	53	9,625	10,565		1,125	895	57,000	643	264	1,037	86,813
Northumberland and Durham....	10	17,526	17,096				15,000	1,203	662	474	78,577
Prince Edward	213	5,253	4,843		5,000	1,050	2,971	149	67	95	21,816
Lennox and Ad- dington	352	7,718	8,850		4,800	5,958				202	31,917
Frontenac	1,625	8,117	6,606		26,500	6,481	30,000	525	1,092	e23,891	110,817
Leeds and Gren- ville	4,631	8,600	12,174	f11,571		2,050		488	304	506	46,150
Stormont, Dundas and Glengarry..	356	8,693	18,246		4,757	1,775	5,500	294	955	1,221	47,127
Prescott and Rus- sell	1,064	6,605	6,678				20,704	448	5,796	1,267	46,386
Carleton	3,144	18,709	4,898			3,150			1,748	1,826	45,558
Renfrew	502	9,144	10,438	811	1,867	1,973			592	308	30,947
Lanark	1,303	6,834	6,755				6,500	158	1,267	888	28,720
Victoria	453	11,591	7,566				22,500	943	2,080	1,407	57,177
eterborough	115	9,879	5,180	2,275	1,229	1,937	10,500	362	1,043	817	42,995
Haliburton		1,204	3,803		1,268	244	6,400	136	682	69	15,050
Hastings	235	16,488	13,201	10,448	605	4,600	35,021	1,710	623	668	112,424

a Special deposit.

c See note under "Receipts" to "Rates from local municipalities."

d Including \$62,235 amount of ex-treasurer Sandford's defalcations.

e Including \$23,313 shortage of ex-treasurer.

f Including \$9,000 special deposit.

COUNTY MUNICIPALITIES.—Continued.

Assets.						Liabilities.						
Cash in treasury.	Rates due from local municipalities.	Sinking Fund and other investments in stocks, mortgages, debentures, etc., special deposits, etc.	Land, buildings, furniture, etc.	Miscellaneous.	Total.	School grants unpaid.	Railway debentures outstanding (principal).	All other debentures outstanding (principal).	Loans for current expenses and interest due on same.	Local municipalities for non-resident taxes collected.	Miscellaneous.	Total.
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
4,444	17,596		a70,000	7,074	99,114			25,463	17,000	869		43,332
8,218	24,541		b168,073	3,618	204,450		9,477	35,323	18,000	1,566	1,376	65,742
11,235	23,112		125,576		159,923			12,555	26,500	41		39,096
1,636	2,320		50,000		53,956							
754	1,915		27,500	500	30,669				1,550	148		1,698
425	10,298		128,726	96	139,545	1,482		3,613	5,548			10,643
5,094	4,932		54,500		74,526			14,904	5,000	2,353	60	22,317
3,528	26,052	12,066	77,000		118,646			73,000	11,000	452		84,452
8,906	4,955	c8,000	55,000	1,828	78,689	965				4	4,362	5,331
1	7,335	23,886	87,638		118,860	25		26,000		653	13	26,691
14,141	30,872	d22,600	129,000	f17,458	214,071		21,000		g60,875	h34	i25,795	107,704
38,416	59,949	50,981	86,191	13,305	248,842			j511,260		992	9,473	521,725
17,952	6,777		190,000	598	215,327	375		132,897		203	3,152	136,627
9,294			104,000		113,294			11,419				11,419
6,633	16,656		125,000	273	148,562		120,000	85,000		7	k2,215	207,222
8,924	37,301		84,000	2,869	133,094	3,433			23,000	414	3,625	30,472
710	2,305		85,000	1,223	89,238			26,100	7,000			33,100
547	8,333	8,197	40,000	1,248	58,325	1,119		19,500		803	1,858	23,280
3,867	12,842		101,000		117,709			10,289	4,500	397	25	15,211
23,292		9,185	121,000	4,927	168,404			11,000		32	4,304	15,336
4,907	1,311		50,000		56,218	465						465
4,906			56,286		61,192							
	22,420	m6,321	100,000	n55,799	184,540	1,026		46,007	34,826	6,321	13,779	101,959
10,131	7,141		50,000	182	67,454			16,783	15,000	667		32,450
18,879	14,231		50,500	1,459	85,069				45,000			45,000
	9,120		33,500		42,620	50	15,000		3,672			18,722
5,181	16,143		55,000		76,324			96,900		10		96,910
3,867	21,432	o2,000	125,000	8,238	160,537		171,500	500	3,000	1,004	4,672	180,676
	20,398	p24,311	130,000		174,709	165		45,000	q9,164	100	1,000	55,429
770	11,494		61,000	r30,905	104,169		30,735	10,035	4,000		260	45,030
490	12,092		20,000		32,582				18,869			18,869
	18,261	25,000	179,000		222,261			60,000	324		1,600	61,924
3,148	15,657	4,983	50,000	1,532	75,320	50		37,450		407	729	38,636
4,722			54,000		58,722							
2,078	20,202		66,755	2,378	91,413	200			25,000	734	25	25,959
	13,266	5,654	93,355	1,283	113,558	923		43,002	9,253	721	3,999	57,898
328	6,206			58	6,592	25	2,000		2,500		1,313	5,838
442	32,590	74,345	60,000		167,377	600	50,000	29,395	36,668	180	5,065	121,908

a Omitting \$14,000 Windsor's share of buildings. b Including \$89,000 for bridges. c Special deposits d Comprising \$4,000 special deposits; \$18,000 estimated value of stock in Northern Ry. and \$300 estimated value of stock in Agricultural Society property. e Including \$20,000 for bridges. f Including \$14,675 various properties of late treasurer's estate. g Omitting \$5,000 Sandford's loan from Bank repudiated by County pending decision of Court. h Omitting \$350 overstated in 1895. i Including \$30,000 in course of adjustment, payable to local municipalities re "group bonus." j Including \$3,000 matured in 1874, but not presented for payment up to date. k Local municipalities for road-grants. l Including \$40,000 for roads. m Balance to credit of non-resident tax account. n Including \$19,465 payable by township of York for debentures re non-resident taxes guaranteed by county. o Other investments. p Including \$10,798 special deposits. q Including \$8,538 House of Refuge "Overdrafts" r Comprising chiefly advances to sundry local municipalities for drainage.

FINANCIAL STATEMENT. — TOWNSHIP MUNICIPALITIES.

TABLE XI. Summary statement showing the totals for all townships in Ontario of the several items of Receipts, Disbursements, Assets and Liabilities for the ten years ending December 31st, 1888-1897.

Schedule.	1897.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.
RECEIPTS.										
Balance from the previous year	444,150	559,452	478,431	476,233	539,298	501,217	474,360	441,354	462,869	409,958
<i>Ordinary municipal revenue:</i>										
Municipal and school taxes	4,558,830	4,286,861	4,478,927	4,573,620	4,463,043	4,709,176	4,440,478	4,563,863	4,315,642	4,355,165
Licenses (liquor and other)	46,723	47,758	49,539	62,084	64,577	70,664	72,337	73,942	69,326	49,466
Fees, rents, fines, &c.	12,423	11,873	12,363							
Refund of loans, investments and deposits	199,040	273,483	232,825							
Interest and dividends	72,385	65,774	68,217							
<i>Loans:</i>										
Money borrowed for current expenses	450,533	548,495	525,677	591,014	457,466	419,335	580,354	477,099	403,817	329,684
Money borrowed on debentures for—										
Schools	56,673	49,982	61,870	54,324	57,397	94,707	47,160			
Drainage	233,924	163,023	260,369							
Other purposes	20,800	49,445	96,445	285,400	252,148	300,999	332,504	403,838	330,080	353,986
Premiums on debentures sold	11,525	4,068	11,798							
Grants from county for roads, &c.	22,879	39,467	36,395	201,930	137,958	129,494	191,711	130,281	145,042	148,489
Miscellaneous	78,621	86,486	94,222							
Totals	6,308,516	6,186,167	6,406,670	6,539,412	6,188,870	6,460,682	6,656,630	6,369,195	6,091,767	5,943,517
DISBURSEMENTS.										
<i>Expenses of municipal Government:</i>										
Allowances, salaries and commissions	292,206	287,272	285,835	285,560	285,188	287,882	281,802	274,430	271,649	257,691
Law costs, including salaries	51,865	34,090	60,491	138,693	128,700	137,748	119,487	127,872	121,961	96,631
Other expenses of municipal Government	93,321	89,827	84,952							
<i>Construction works:</i>										
Roads and bridges	706,091	702,212	639,241	796,775	806,781	743,651	755,823			624,458
Buildings and other works	21,891	16,439	8,883	7,303	11,836	17,201	23,615			171,844
Drainage works	275,869	258,919	27,492	297,286	275,941	287,215	275,551	284,799	192,161	66,612
Support of the poor and other charities	58,773	58,543	66,655	65,621	62,332	66,849	68,421	67,469	64,224	1,156,979
County treasurer for levy	958,975	994,609	1,091,953	1,086,752	1,098,967	1,204,116	1,145,037	1,166,283	1,106,129	

Payments on schools and education	1,935,503	1,813,537	1,796,237	1,831,241	1,820,007	1,904,746	1,782,303	1,884,569	1,857,349	1,824,798
Sinking fund investments and deposits	89,621	118,214	123,143	123,143	149,768	165,841	194,072	211,228	220,844	191,169
Other investments and special deposits	160,427	161,024	162,983	285,384						
Loans repaid:										
Debtures redeemed (principal) —										
School	68,140	65,230	67,409	483,946	355,363	365,012	641,382	325,834	443,419	366,965
Drainage	182,884	219,201	219,588							
All other	72,186	100,693	85,851							
Interest on loans, advances, debtures	168,620	177,504	183,563	180,027	177,693	187,720	200,504	198,674	194,710	203,698
Money borrowed for current expenses	518,518	537,482	572,968	524,212	407,063	460,546	508,355	484,326	353,262	331,578
Board of Health	17,449	15,298	22,293	128,091	132,898	142,857	159,661	130,323	139,394	188,225
Miscellaneous	96,563	121,933	147,991							
Totals	5,766,892	5,742,017	5,847,218	6,060,981	5,712,637	5,921,384	6,155,413	5,884,835	5,650,413	5,480,648
ASSETS.										
Cash in treasury	541,624	444,150	659,452	478,431	476,233	539,298	501,217	474,360	441,354	462,869
Taxes in arrears	1,412,171	1,577,267	1,610,480	1,596,099	1,572,817	1,373,503	1,511,872	1,339,039	1,434,687	1,258,346
Sinking Fund investments and deposits	498,619	452,819	425,269							
Other investments and special deposits	1,067,449	1,062,630	1,064,519	1,442,922	1,371,296	1,396,451	1,373,830	1,590,414	1,578,466	1,647,496
School lands, buildings and equipment	767,545	721,090	616,559	884,043	835,781	766,140	742,069	337,068	331,351	324,016
Lands, buildings and other property	403,904	379,729	355,305							
Miscellaneous	615,822	564,968	436,379	451,907	561,903	530,727	462,641	290,012	184,337	180,823
Totals	5,307,134	5,202,553	5,072,963	4,868,402	4,818,030	4,606,119	4,591,629	4,030,893	3,970,225	3,873,550
LIABILITIES.										
County levy	438,311	474,425	574,634	563,909	537,085	470,342	506,361	471,320	502,359	438,579
Local school rates	292,071	333,291	299,052	280,176	273,812	229,731	240,810	219,086	225,894	181,527
Debtures outstanding (principal) for —										
Aid to railways	984,196	1,015,669	1,057,852	1,058,761	1,106,290	1,120,100	1,178,027	3,366,617	3,299,557	3,408,744
Schools	454,119	463,586	478,834	481,065	496,311	505,250	479,737			
Drainage	1,253,902	1,142,862	1,206,232	1,401,841	1,437,222	1,464,084	1,460,875			
Other purposes	224,874	244,787	249,725							
Due Sinking Fund	20,857	18,480	25,001	382,096	308,567	259,168	300,020	188,067	195,872	143,004
Loans for current expenses and interest	257,215	331,123	314,116							
Miscellaneous	167,768	158,481	174,752	127,699	171,949	149,846	146,364	121,876	126,343	80,019
Totals	4,093,313	4,182,704	4,350,228	4,296,147	4,331,236	4,198,517	4,312,194	4,367,566	4,350,025	4,260,873

The total receipts do not include Legislative grants for schools, not being considered a municipal transaction. This also refers to towns, villages and cities.

FINANCIAL STATEMENT—TOWN MUNICIPALITIES.

TABLE VII. Summary showing the totals for all towns in Ontario of the several items of receipts, disbursements, assets, and liabilities, for the six years ending December 31st, 1891-1897.

Schedule.	1897.	1896.	1895.	1894.	1893.	1892.	1891.
RECEIPTS.							
Balance from previous year	257,955	244,963	165,782	149,398	158,867	197,338	162,109
Municipal and school taxes	2,037,688	1,964,716	1,971,028	1,932,387	1,840,603	1,877,361	1,708,632
Licenses (liquor and other)	107,539	108,549	111,522	176,600	183,645	173,854	169,213
Fees, rents, fines, etc.	58,265	58,202	57,380	119,172	99,670	84,207	61,654
Water rates, electric light rates, etc.	196,797	164,725	152,224	119,172	99,670	84,207	61,654
Refunds of loans and special deposits.	239,175	165,291	190,884	242,012	268,126	175,210	198,470
Interest and dividends	47,849	40,911	37,591	1,789,250	1,362,564	2,255,191	1,854,668
Loans for current expenses	1,731,618	1,682,395	1,407,460	62,236	131,000	45,750	104,800
Money borrowed on debentures for { Schools	34,093	60,400	771,320	69,700	1,019,269	928,768	950,707
Other purposes	798,131	747,861	31,784	73,522	69,181	85,093	95,176
Premium on debentures sold	31,748	39,953	7,289	73,522	69,181	85,093	95,176
County grants	2,022	6,307	53,872	5,231,355	5,362,915	5,822,772	5,304,829
Miscellaneous	68,546	37,683	5,020,372	5,231,355	5,362,915	5,822,772	5,304,829
Totals.	5,677,826	5,311,936	5,020,372	5,231,355	5,362,915	5,822,772	5,304,829
DISBURSEMENTS.							
<i>Expenses of municipal government:</i>							
Allowances, salaries, commissions	122,203	120,538	121,207	119,792	127,903	122,790	123,318
Lighting of streets, water supply and fire protection	328,964	316,255	315,437	298,594	278,379	297,913	246,896
Law costs (including salaries)	25,119	22,142	40,561	108,788	122,665	89,761	92,359
Other expenses of government	87,663	79,622	81,338	108,788	122,665	89,761	92,359
<i>Construction works:</i>							
Streets, bridges and parks	325,302	351,668	304,857	338,226	376,989	392,318	461,513
Buildings and other works	73,335	65,524	45,262	292,537	366,317	679,559	575,140
Waterworks and electric light plant	421,279	384,838	316,926	30,664	32,747	31,421	31,918
Support of the poor and other charities	35,371	31,234	33,908	66,251	62,418	60,018	58,334
Administration of justice, police service	79,423	75,784	67,279	89,660	89,240	105,611	91,164
County treasurer for levy	90,909	97,181	93,719	89,660	89,240	105,611	91,164
Payments for schools and education	643,347	607,449	633,338	656,246	689,271	618,537	636,847
Sinking fund investments and deposits	259,026	160,452	145,353	246,378	272,987	275,745	198,524
Other investments and special deposits	61,315	91,986	82,346	246,378	272,987	275,745	198,524

Debtures redeemed { School.....	58,527	71,378	44,082	358,691	453,632	316,247	402,168
Interest on loans and debentures { All other.....	515,822	229,187	314,543	502,885	456,984	424,319	392,393
Money borrowed for current expenses.....	480,879	486,894	502,885	1,810,483	1,745,922	2,077,473	1,625,051
Board of Health.....	1,634,743	1,684,174	1,481,901	12,868	197,299	202,193	173,866
Miscellaneous.....	13,905	10,626	13,776	5,065,573	5,213,517	5,663,905	5,107,491
Totals.....	5,478,122	5,053,981	4,775,814	165,782	149,398	158,867	197,388
ASSETS.							
Cash in treasury.....	199,704	257,955	244,558	864,006	856,825	698,649	741,036
Taxes in arrear.....	882,748	885,956	863,494	1,266,082	1,263,985	1,220,071	1,062,593
Sinking Fund investments and deposits.....	806,668	793,170	625,479	2,403,820	7,320,058	6,702,886	6,074,136
Other investments and special deposits.....	586,228	618,862	2,644,387	2,986,528	573,210	383,683	230,994
School lands, buildings and equipment.....	2,439,169	2,417,880	2,403,820	10,925,675	10,181,957	9,164,156	8,306,097
Waterworks and electric light plant.....	3,139,171	2,890,983	2,986,528	10,119,105	9,371,229	8,817,157	8,003,698
Other buildings and property.....	2,983,178	2,950,183	458,153	170,903	174,088	188,898	240,962
Miscellaneous.....	1,237,538	1,127,298	10,925,675	10,119,105	9,371,229	8,817,157	8,003,698
Totals.....	12,314,404	11,942,237	10,925,675	10,119,105	9,371,229	8,817,157	8,003,698
LIABILITIES.							
County levy.....	33,571	34,242	40,176	36,742	44,261	34,924	46,809
Local school rates.....	187,261	193,869	185,911	176,931	165,324	157,434	175,028
Debentures outstanding for { Aid to railways.....	608,594	607,105	652,143	722,628	854,866	875,920	893,090
{ Schools.....	*895,224	1,023,429	1,034,407	1,025,020	974,874	879,706	870,445
{ Other purposes.....	*8,331,797	7,967,529	7,403,818	6,863,404	6,392,549	5,736,252	5,012,180
Due Sinking Funds.....	394,551	*120,617	87,791	735,877	765,267	944,023	765,184
Loans for current expenses and interest.....	661,542	575,526	572,187	170,903	174,088	188,898	240,962
Miscellaneous.....	237,460	213,585	142,672	170,903	174,088	188,898	240,962
Totals.....	11,095,000	10,735,902	10,119,105	9,371,229	8,817,157	8,003,698	7,291,698

* Omitting \$103,771. Toronto Junction School Debentures, transferred to Other Debentures. + Including \$5,323, formerly reported as debenture liability of Penetanguishene, but really being Penetang's share of debentures issued by Tiny Township. + Including Peerborough \$25,073, Woodstock \$23,059, Port Arthur \$14,743, Fort William \$12,080, Walkerton \$7,794, Seaforth \$3,100, Kincardine \$2,825, Bracebridge \$1,390, Ingersoll \$1,772, Uxbridge \$1,287, Orangeville \$711, Mat-tawa \$139. a The electric and other light plants in 1897 aggregated \$381,988 as follows: Amherstburg \$3,500, Leamington (natural gas) \$25,000, Thorold \$12,000, Godenich \$17,563, Kincardine \$13,044, Collingwood (including fire balls) \$30,117, Orillia \$32,221, Mitchell \$9,000, St. Marys \$2,050, Berlin (gas) \$960, Niagara \$17,904, Dundas \$1,022, Newmarket \$11,482, Toronto Junction \$24,000, Picton \$17,500, Trenton \$12,000, Bracebridge \$12,000, Sudbury \$17,400, Port William \$3,417, Port Arthur \$113,808, (North Toronto, in addition to the foregoing, has an electric light plant estimated at \$10,000, in connection with waterworks plant).

FINANCIAL STATEMENT—VILLAGE MUNICIPALITIES.

TABLE XIII. Summary showing the totals for all villages in Ontario of the several items of receipts, disbursements, assets and liabilities for the six years ending December 31st, 1891-97.

Schedule.	1897.	1896.	1895.	1894.	1893.	1892.	1891.
RECEIPTS.							
Balance from previous year	*88,589	78,973	67,269	72,950	74,284	51,976	\$ 58,407
<i>Ordinary municipal revenue:</i>							
Municipal and school taxes	576,392	541,849	545,809	526,672	499,040	516,683	491,360
Licenses (liquor and other)	33,687	34,487	34,872	42,746	45,274	42,783	43,764
Fees, rents, fines, etc.	8,301	8,941	8,738	12,989	10,426	8,080	7,506
Water rates, etc.	17,765	14,897	15,344	15,344	13,495	30,144	25,231
Refund of loans and special deposits	37,047	22,235	25,905	17,266	18,495		
Interest and dividends	5,932	5,650	6,223	17,266	13,495		
Loans for current expenses	180,273	165,279	176,428	135,745	119,191	151,779	124,087
Money borrowed on debentures for—							
Schools	22,100	7,443	29,100	23,050	20,300	50,437	18,500
Other purposes	92,690	84,706	67,797	73,577	35,325	99,100	45,559
Premiums on debentures sold	6,519	1,876	5,099				
County grants	2,391	4,148	2,887	32,731	14,053	23,829	17,184
Miscellaneous	21,453	18,309	15,340				
Totals	1,093,139	988,793	1,000,811	913,726	881,388	974,821	831,598
DISBURSEMENTS.							
<i>Expenses of municipal government:</i>							
Allowances, salaries, commissions	35,661	36,604	37,793	37,139	39,336	37,042	34,787
Lighting of streets, water supply and fire protection	51,304	47,832	46,151	41,690	32,251	30,065	29,106
Law costs (including salaries)	7,794	6,119	5,983	28,392	29,794	26,563	23,336
Other expenses of government	22,986	22,134	23,054				
<i>Construction works:</i>							
Streets, bridges and parks	98,659	98,290	99,662	98,572	94,408	82,039	99,187
Buildings and other works	45,048	11,891	20,570	65,191	27,203	85,293	24,921
Water and electric light works	29,223	30,385	39,024				
Support of the poor and other charities	5,365	5,842	6,552	5,858	5,064	5,163	6,196
Administration of justice, police service	9,761	8,477	7,952	7,664	4,255	4,594	4,174

Payments for schools and education.....	43,621	36,116	42,434	41,628	39,541	41,369	38,221
Sinking Fund investments and deposits.....	250,080	228,983	242,466	232,204	214,447	257,662	207,100
Other investments and special deposits.....	20,717	21,461	14,606	35,679	14,560	26,129	37,734
Debtures redeemed.....	25,229	31,542	18,851	52,120	60,624	56,066	54,477
Interest on loans and debentures.....	53,196	72,300	35,135	62,352	63,902	62,652	60,811
Money borrowed for current expenses.....	65,401	68,207	68,612	134,536	107,713	157,596	128,370
Loan for health.....	192,800	137,119	176,133	36,132	25,280	28,114	31,252
Board of Health.....	2,531	2,740	2,962	876,457	758,438	900,537	779,622
Miscellaneous.....	38,959	31,366	21,217				
Totals.....	1,010,665	899,605	921,433				
Cash in treasury.....	82,474	89,188	79,378	67,269	72,950	74,284	51,476
Taxes in arrears.....	152,293	161,795	147,273	139,335	134,463	113,336	123,783
Sinking Fund investments and deposits.....	487,651	92,526	86,181	132,914	136,888	112,414	111,945
Other investments and special deposits.....	45,882	47,278	48,742				
School lands, buildings and equipment.....	945,396	922,325	905,522				
Waterworks and electric light plant.....	455,600	381,913	368,262	1,610,732	1,498,254	1,469,220	1,330,919
Other buildings and property.....	514,117	493,148	495,053				
Miscellaneous.....	62,116	38,798	61,606	57,178	48,309	51,621	48,130
Totals.....	2,345,58	2,226,971	2,192,017	2,007,428	1,890,814	1,820,275	1,666,753
County levy.....	19,533	20,845	16,692	15,041	19,880	16,845	15,647
Local rates.....	62,659	65,478	55,432	50,089	47,694	35,501	42,891
Debentures (principal) outstanding for—							
Aid to railways.....		92,132	115,017	119,580	122,315	123,109	136,054
Schools.....	43,273	320,872	344,971	331,004	328,444	321,997	286,181
Other purposes.....	\$74,925	750,092	715,815	679,658	631,717	637,362	571,705
Due Sinking Funds.....	119,014	17,900	13,569	68,755	66,157	53,920	59,768
Loan for current expenses and interest.....	70,019	83,127	60,004	48,851	43,644	43,265	42,788
Miscellaneous.....	59,103	54,540	55,008				
Totals.....	1,390,613	1,404,986	1,376,508	1,313,678	1,259,851	1,236,999	1,155,039

* Omitting \$599 transferred from London South to London City.

+ " \$1,061 " " " " " " "

+ " \$5,000 " " " " " " "

+ " \$34,176 " " " " " " "

|| Including East Toronto, \$5,910; Madoc, \$4,440; Lucknow, \$3,344; Blyth, \$3,321; Beaverton, \$1,100; Arthur, \$567; Tilbury, \$332.

* The electric and other light plants in villages in 1897, aggregated \$57,534, as follows: Kingsville (natural gas) \$30,000, Tilbury \$2,000, Markham \$2,500 Campbellford \$10,000, Alexandria \$6,500, Huntsville \$6,534.

FINANCIAL STATEMENT—CITY MUNICIPALITIES.

TABLE XIV. Summary statement showing the totals for the thirteen Cities of the Province of Ontario of the several items of Receipts, Disbursements, Assets and Liabilities for the ten years ending December 31st, 1888-89.

Schedule.	1887.	1886.	1885.	1884.	1883.	1882.	1881.	1890.	1889.	1888.
Receipts.										
Balance from previous year	\$715,390	543,686	378,541	395,266	579,254	559,040	368,401	277,173	670,856	220,744
<i>Ordinary municipal revenue:</i>										
Municipal and school taxes	4,905,002	5,088,215	5,164,106	5,115,418	5,172,759	4,717,113	4,737,229	4,089,109	3,911,167	3,215,747
Lottery licenses	95,419	62,222	93,893	99,185	102,336	99,669	100,593	161,559	110,897	145,936
Other licenses	41,754	33,186	41,637	42,369	42,809	45,597	50,650	50,451	55,769	36,942
Fees, rents, tolls, fines, etc.	391,691	410,453	376,122	373,111	374,736	363,014	360,651	1,093,664	1,031,753	1,062,580
Water rates, electric light, gas rates, etc.	1,028,673	1,008,123	983,534	986,249	886,333	892,574	886,139			
Interest on bank deposits, sinking fund and other investments and dividends	309,612	285,883	218,532	244,439	192,110	241,515	168,686	140,205	170,366	153,521
<i>Subsidies and refunds:</i>										
Government (except loans and schools)	18,638	20,388	20,641	16,185	24,419	22,332	18,498	19,358	15,439	18,513
Moneys loaned or invested (including sinking funds and special deposits)	1,662,182	916,784	444,724	512,083	292,122	26,481	294,746	359,220	55,249	188,187
<i>Loans:</i>										
Money borrowed for current expenses	1,849,188	1,377,426	1,901,123	2,214,476	2,874,212	2,654,513	3,961,752	4,622,735	2,777,851	4,681,893
Money borrowed on debentures—										
For school purposes	450,000	135,500	213,500	67,000	15,000	380,522	138,745	1,426,717	4,855,674	1,640,912
For all other purposes	2,462,888	2,892,152	2,692,179	4,413,452	2,771,880	2,788,956	3,461,235	417,992	456,336	428,843
Miscellaneous	429,766	336,975	255,511	187,974	395,797	721,667	1,683,081			
Totals	13,891,233	13,146,919	12,794,043	14,669,207	13,722,767	13,425,011	16,305,550	12,607,732	14,622,631	11,756,906
<i>Disbursements.</i>										
<i>Expenses of municipal government:</i>										
Allowances, salaries and commissions	192,948	199,288	174,900	153,905	159,147	154,754	154,844	154,237	150,365	130,488
Printing, advertising, postage, stationery	35,998	31,346	36,151	32,343	37,982	31,457	37,685	39,922	38,106	38,738
Insurance, heating, lighting buildings	46,074	30,175	38,265	50,723	53,542	47,827	72,118	35,708	28,371	21,564
Law costs (including salaries)	65,056	69,637	69,597	69,360	66,846	65,780	35,312	45,926	35,769	36,942
Lighting of streets	245,456	254,797	282,986	278,626	275,618	265,313	270,237	840,809	856,873	767,247
Water supply and fire protection	720,294	716,095	727,622	750,721	685,179	586,951	613,455			
Election of members of council	10,057	13,298	10,121	17,483	10,750	10,556	8,188	68,436	70,984	60,408
Other expenses of municipal government	68,128	111,936	71,708	64,631	81,377	59,840	61,889			
<i>Construction works:</i>										
Streets, bridges and parks	1,398,771	830,892	1,254,390	1,201,287	1,672,647	1,846,859	1,782,703	2,348,709	2,283,921	1,738,762
Water-works, sewers and electric light	333,916	354,112	491,656	104,513	277,326	316,071	798,903	1,188,419	1,268,687	789,651
Buildings and other property	555,481	527,074	243,383	439,197	639,460	281,267	182,681			

Support of the poor and other charities	175,327	157,318	147,994	150,597	165,211	10,431	17,820	114,831	105,143	110,966	109,140
Administration of justice, police service, etc.	508,610	508,610	517,628	516,568	510,034	510,034	510,034	516,583	535,662	489,512	470,185
Payments on schools and education	1,068,928	1,141,815	1,134,140	1,044,689	1,068,658	1,068,658	1,068,658	979,176	1,062,372	1,060,538	863,797
<i>Investments and deposits:</i>											
Sinking Fund investments and deposits	2,079,598	1,543,124	1,233,643	913,362	989,008	989,008	820,751	597,411	901,120	531,568	674,014
Other investments and special deposits	122,431	252,250	22,517	136,564	126,404	126,404	40,467	28,972			
<i>Loans and interest:</i>											
Debentures redeemed. { Principal	2,176,917	2,009,385	1,250,919	3,196,946	2,354,186	2,354,186	456,150	664,236	421,635	1,150,997	299,092
Interest	1,632,664	1,625,365	1,690,748	1,695,713	1,566,840	1,566,840	1,521,264	1,395,958		1,295,860	1,231,665
Interest or discount on loans, etc.	99,369	92,125	91,225	101,462	86,847	86,847	116,550	252,690	1,427,955		
Monies borrowed for current expenses	1,250,688	1,336,975	2,332,320	2,691,441	2,065,504	2,065,504	4,004,716	4,900,248	2,648,523	4,026,535	3,503,631
Discount on debentures sold	3,625	30,219	36,000	107,768	41,888	41,888	148,393	107,251	382,866	790,712	462,249
Library	57,666	57,047	51,631								
Miscellaneous	345,756	482,546	363,385	294,837	350,552	350,552	361,897	1,965,456			
Totals	13,301,342	12,432,208	12,250,357	14,290,666	13,327,501	12,843,757	15,746,510		12,238,831	14,343,458	11,086,030
<i>ASSETS.</i>											
Cash in treasury (exclusive of sinking funds)	589,891	714,791	543,686	378,541	395,266	395,266	579,254	559,040	368,901	277,173	670,856
Taxes in arrear	2,205,219	1,992,178	1,975,369	1,818,758	1,732,209	1,732,209	1,955,491	1,395,387	1,239,142	1,018,218	1,088,844
Sinking Fund investments and deposits	7,381,842	6,831,025	6,277,778	6,963,292	6,425,681	6,425,681	5,619,138	4,785,238	4,445,573	3,912,987	3,881,441
Other investments (incl. special deposits)	\$1,745,994	1,833,607	1,496,880	1,917,367	1,917,367	1,917,367	10,274,362	9,538,207			
Land, buildings, etc.	12,447,827	12,370,784	12,272,758	11,917,352	8,224,648	8,224,648	3,207,059	3,112,053			
School property (including equipment)	4,013,019	3,848,059	3,771,689	3,506,648	3,294,577	3,294,577	9,126,394	8,324,883			
Waterworks	10,481,486	10,421,768	10,398,892	10,107,936	9,439,334	9,439,334	1,149,700	1,140,162			
Other property (cemetery, fire halls, etc.)	11,461,036	1,389,534	1,437,563	1,313,667	1,194,684	1,194,684	5,455,789	5,063,179	5,110,639	2,836,608	1,752,732
Miscellaneous	3,673,267	4,016,053	3,738,741	4,017,423	4,941,034	4,941,034	39,967,187	34,555,149	32,786,749	27,042,991	25,560,199
Totals	44,038,981	43,417,839	41,913,896	40,023,582	38,725,665	38,725,665	76,582	61,343	61,917	76,002	44,595
<i>LIABILITIES.</i>											
Local school rates unpaid	9,308	16,562	25,988	27,194	34,185	34,185					
<i>Debentures outstanding (principal):</i>											
Aid to railways	2,443,600	2,492,981	2,165,327	2,164,754	2,212,386	2,212,386	2,282,075	2,279,220			
Schools	2,410,542	2,392,624	2,303,931	2,146,665	2,081,874	2,081,874	2,119,322	1,767,801			
Local improvements	9,603,424	10,388,596	10,606,307	10,779,224	10,041,508	9,605,061	9,605,061	8,057,144			
Municipal works	7,607,042	47,676,351	47,234,656	12,716,562	14,463,464	13,878,693	13,878,693	13,192,236			
All other objects	15,521,769	14,142,703	14,142,703	6,970,919	4,594,831	4,594,831	5,081,220	4,595,643			
Loans for current expenses and interest	1,709,406	1,110,364	1,069,423	1,505,236	1,960,411	1,960,411	1,132,948	2,515,938			
Miscellaneous	1,607,280	1,919,232	1,596,634	1,898,733	1,511,872	1,511,872	2,048,420	1,863,449	3,544,503	1,479,160	2,622,807
Totals	41,172,431	40,517,388	39,144,959	38,209,307	36,905,531	36,224,321	34,938,773		32,822,314	29,935,305	25,828,758

* Including \$599 transferred to London city from former village of London West. + Brantford, \$41,000; Ottawa, \$35,000. † Including \$29,043 in premiums on debentures sold (Ottawa, \$15,023; Kingston, \$4,494; Hamilton, \$867; St. Thomas, \$369; Belleville, \$2,137; Chatham, \$3,051; Guelph, \$261; Windsor, \$2,481). \$ On omitting \$37,243 School Board investments formerly included in Chatham City municipal investments. Including \$1,011 for electric light in Brantford, \$25,000 for electric light plant in Windsor, and \$15,000 for electric light plant in Chatham. ¶ The disparity in classification here is due to general and consolidated replacing special debentures. α Including \$39,176, London West village debentures assumed by London city.

FINANCIAL STATEMENT-COUNTY MUNICIPALITIES.

TABLE XV. Summary statement showing for all Counties of Ontario the aggregate totals of the several items of Receipts, Disbursements, Assets and Liabilities for the ten years ending December 31st, 1888-97.

Schedule.	1897.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.
RECEIPTS.										
Balance from previous year.....	222,663	221,381	224,203	262,914	347,192	303,802	298,066	275,552	375,556	305,689
<i>Ordinary municipal revenue:</i>										
Rates from local municipalities.....	1,097,659	1,111,043	1,243,999	1,258,060	1,231,039	1,372,862	1,303,572	1,312,795	1,244,209	1,399,447
Licenses.....	12,378	12,357	12,573	13,697	14,013	12,843	12,602	12,602	12,602	12,602
Fees, rents, tolls, fines, etc.....	12,454	24,939	25,657	24,966	29,539	33,394	35,100	83,882	104,697	148,657
Surplus fees from registrar.....	13,292	16,951	13,626	13,351	16,365	19,636	20,270	20,270	20,270	20,270
Interest on deposits and dividends on investments.....	16,101	34,058	30,501	33,063	31,215	33,638	49,433	45,259	44,202	42,005
<i>Loans:</i>										
Money borrowed for current expenses.....	672,907	742,454	581,717	752,801	697,950	627,984	640,987	466,258	441,549	348,856
Money borrowed on debentures.....	117,516	200,419	65,301	301,600	158,323	27,800	248,470	114,847	58,178	120,515
Non-resident taxes collected.....	81,235	71,176	99,044	89,459	95,026	103,997	107,513	93,130	101,671	109,823
Towns or cities separated from county for various services.....	97,257	107,562	95,797	102,615	96,147	98,139	94,891	101,800	91,279	99,261
<i>Subsidies and Refunds:</i>										
Refund of moneys loaned or invested.....	35,530	422,348	226,492	381,353	216,612	207,475	459,897	133,275	175,176	168,451
Received from Government.....	149,606	142,717	144,095	142,180	139,714	140,461	143,050	142,943	144,194	152,496
For schools.....	171,541	148,916	161,820	141,868	122,261	120,658	144,545	139,312	120,926	123,204
For administration of justice.....	8,144	12,167	194	4,464	209	4,141	29,339	33,273	34,010	39,106
For other purposes, except loans.....	97,506	83,165	28,232	48,469	111,718	37,838	40,484	33,273	34,010	39,106
Macellaneous.....										
Totals.....	2,805,889	3,353,651	2,953,150	3,570,260	3,307,323	3,144,768	3,628,219	2,942,326	2,935,687	3,063,510
DISBURSEMENTS.										
<i>Expenses of municipal government:</i>										
Attendance at meetings of council and committees.....	43,443	72,772	62,740	67,512	67,100	63,959	67,920	64,132	59,617	55,523
Allowances, salaries and commissions.....	74,508	75,669	77,113	77,472	82,234	84,771	89,655	94,412	93,737	92,538
Printing, advertising, postage and stationery.....	26,548	25,650	22,654	22,113	22,921	21,593	22,776	23,275	23,783	23,395
Insurance, heating, lighting and care of buildings.....	32,448	31,395	31,395	37,389	43,257	37,939	30,423	29,423	27,801	29,415
Salaries of officers and employees.....	6,453	19,038	11,489	28,351	17,209	11,181	11,464	29,459	28,174	22,896
Interest on loans.....	22,741	11,816	15,360	16,393	17,187	18,394	20,554	29,459	28,174	22,896

FINANCIAL STATEMENT—ONTARIO MUNICIPALITIES.

TABLE XVI. Summary statement showing for all Municipalities in Ontario (including counties, townships, cities, towns and villages), the total of the several items of receipts, disbursements, assets and liabilities for the ten years ending December 31st, 1888-97.

Schedule.	1897.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.
RECEIPTS.										
Balance from previous year.....	a	1,728,747	1,618,455	1,314,226	1,356,761	1,613,373	1,361,843	1,199,140	1,726,279	1,127,264
<i>Ordinary municipal revenue:</i>										
Municipal and school taxes.....	b	12,178,312	11,881,641	12,159,570	12,148,097	11,975,445	11,820,733	11,377,699	10,741,827	10,110,612
Licenses (liquor and other).....	a	337,530	344,036	344,036	836,158	856,929	841,789	776,664	841,789	9,464,466
Fees, rents, fines, etc.....	a	483,134	514,408	480,160	1,118,410	995,429	894,858	955,299	1,691,410	1,611,817
Water rates, electric light or gas rates, etc.....	c	1,242,232	1,187,751	1,151,102	1,118,410	995,429	894,858	955,299	1,691,410	1,611,817
Surplus fees from registrar.....	d	13,232	16,951	13,621	16,365	16,365	19,636	20,270	1,093,896	959,314
Rates from local municipalities.....	d	1,097,689	1,111,043	1,243,999	1,258,060	1,231,039	1,372,862	1,303,672	1,312,795	1,399,447
<i>Subsidies and refunds:</i>										
Received from Government on account of—										
"Schools.....	d	149,606	142,717	144,095	142,180	139,714	140,461	113,050	142,943	152,496
Administration of justice.....	d	180,877	169,304	161,820	141,868	122,261	120,458	144,545	139,312	129,204
Refund of loans, investments and special deposits.....	d	2,232,984	1,790,130	1,120,830	1,721,963	1,240,663	949,153	1,714,189	1,242,172	1,029,316
Interest and dividends.....	a	451,879	432,287	391,064	1,721,963	1,240,663	949,153	1,714,189	1,242,172	1,029,316
<i>Loans:</i>										
Money borrowed for current expenses.....	a	4,892,579	4,516,049	4,592,405	5,483,286	5,711,383	6,108,802	7,161,248	7,414,270	5,348,896
Money borrowed on debentures (face value) for—										
School purposes.....	a	162,866	253,325	366,086	214,074	223,697	571,416	309,205	2,450,880	6,371,104
Other purp. aces.....	a	3,785,949	4,137,606	3,953,322	5,759,403	4,266,935	4,145,783	5,181,465	2,450,880	6,371,104
Non-resident taxes collected.....	d	81,235	71,176	99,044	89,459	95,026	103,997	107,513	93,130	101,671
Towns or cities separated from counties.....	d	97,267	107,562	93,797	102,615	36,147	98,139	91,291	101,806	91,291
Miscellaneous.....	a	660,422	672,585	543,264	568,275	743,385	1,024,394	2,076,473	723,732	759,473
Totals.....		29,776,603	28,987,549	28,175,046	30,953,960	29,413,263	29,826,054	32,726,826	27,753,411	29,231,880
DISBURSEMENTS.										
<i>Expenses of municipal government:</i>										
Attendance at meetings of council & committees.....	d	43,443	72,772	62,740	67,512	67,100	63,959	67,920	64,132	59,617
Allowances, salaries and commissions.....	a	717,526	719,371	696,348	673,268	693,808	687,259	684,306	669,050	619,107
Lighting of sts., water supply and fire protection.....	c	1,346,008	1,337,712	1,372,206	1,369,531	1,271,427	1,150,242	1,179,794	1,093,896	1,073,633
Law costs (including salaries).....	a	156,267	143,877	176,121	614,722	632,230	548,639	536,220	526,167	474,800
Other expenses of municipal government.....	a	451,167	451,167	465,008						
<i>Construction works:</i>										
Roads, bridges, streets and parks.....	a	†2,680,976	2,130,304	2,446,801	2,683,713	3,168,127	3,259,808	3,934,087	5,883,624	3,673,729
Water and electric light works.....	c	824,418	769,365	847,539	1,238,794	1,392,689	1,455,008	1,683,716	1,798,578	1,817,169
Buildings and other works.....	a	719,966	637,881	377,010						1,276,365

<i>Drainage works</i>	275,869	238,919	227,692	257,286	276,941	237,215	276,561	234,759	132,161	171,544
Administration of justice, gaols, police, etc	1,066,070	1,054,505	1,077,891	1,045,597	997,080	1,017,392	1,021,570	993,518	970,183	985,303
Support of the poor and other charities	383,423	383,423	321,965	323,288	298,040	308,137	311,567	288,527	284,345	285,267
County treasurer for levy	1,093,605	1,117,903	1,228,006	1,222,835	1,231,824	1,355,698	1,274,609	1,405,443	1,257,304	1,286,054
Payments on account of schools and education	4,258,034	4,257,036	4,296,862	4,239,625	4,269,723	4,228,004	4,141,417	4,213,856	4,231,033	3,965,572
Sinking Fund investments and deposits	2,501,517	1,969,068	1,699,407	1,846,747	1,813,254	1,452,747	1,241,320	1,596,603	1,354,755	1,408,561
Other investments and special deposits	393,364	546,255	290,121							
(5) <i>Loans repaid</i> :										
Debentures redeemed (principal).....	183,014	215,934	187,526	4,424,647	3,574,353	1,437,070	2,408,097	1,213,673	2,115,879	1,045,743
Interest on loans, advances and debentures	3,131,257	3,199,832	1,966,061	2,552,607	2,568,691	2,482,156	2,498,294	2,240,692	2,087,938	1,999,760
Refund of money borrowed for current expenses	2,553,368	2,568,703	2,578,220	3,992,779	4,352,893	7,320,328	7,806,602	5,309,931	6,389,299	5,459,226
Non-resident taxes paid	4,301,229	4,411,493	5,201,538	94,383	95,820	112,247	98,056	95,589	103,177	107,985
Board of Health	83,313	75,283	112,915	952,200	812,502	1,011,270	2,655,377	867,460	1,338,611	1,101,435
Miscellaneous	102,430	92,312	97,534	29,639,734	28,056,502	28,127,159	31,113,453	26,391,568	28,082,740	24,203,318
Totals	28,135,044	27,258,802	26,526,591	1,314,226	1,356,761	1,698,895	1,613,373	1,361,843	1,199,140	1,726,279
ASSETS.				4,411,047	4,232,438	3,740,979	3,772,078	3,352,104	3,168,072	2,967,446
Cash in treasury	1,641,559	1,728,747	1,648,455	668,960	654,171	550,787	609,513	613,135	632,587	588,236
Taxes in arrears	4,621,331	4,617,196	4,597,668	10,325,356	9,870,539	8,976,898	8,046,071	8,327,436	7,691,092	7,738,971
Rates due from local municipalities	550,055	587,598	663,043	39,766,705	37,673,201	35,741,921	33,862,806	30,947,520	27,863,646	26,515,405
Sinking Fund investments and deposits	8,994,790	8,350,555	7,932,668	5,296,549	6,305,119	6,797,117	6,130,479	5,834,758	3,406,578	2,226,332
Other investments and special deposits	3,542,472	3,604,475	3,277,290	61,782,843	60,092,229	57,476,597	54,014,320	50,436,796	43,951,109	41,762,669
School lands, buildings and equipments	8,185,129	7,969,344	7,702,290	617,942	606,103	592,111	568,847	535,868	581,449	530,240
Water works and electric light plant	14,137,298	13,720,675	13,464,113	570,344	561,264	547,917	554,130	498,348	517,017	425,392
Other buildings and property	20,912,711	20,736,433	20,635,993							
Miscellaneous	5,746,594	5,901,072	4,882,280							
Totals	68,362,009	67,156,035	64,803,530							
LIABILITIES.										
County levy	491,415	529,512	631,502	617,942	606,103	592,111	568,847	535,868	581,449	530,240
School rates and grants unpaid	562,262	621,842	602,988	570,344	561,264	547,917	554,130	498,348	517,017	425,392
Debentures outstanding (principal) for—										
Aid to railways	4,523,719	4,616,120	4,539,187	4,805,897	5,079,604	5,334,129	5,510,114	40,720,985	38,988,332	34,759,527
Schools	4,072,628	4,201,547	4,164,156	3,990,317	3,885,401	3,830,985	3,409,726	4,782,085	2,586,108	3,605,225
All other purposes	44,981,128	44,130,608	43,192,648	40,928,373	39,118,238	38,001,848	34,969,013	19,269	23,461	25,273
Loans for current expenses and interest due on same	3,219,853	2,682,620	2,656,420	3,151,628	3,639,384	2,857,182	4,100,387	4,782,085	2,586,108	3,605,225
Local municipalities for non resident taxes	19,112	21,540	30,070	18,518	19,717	20,510	28,840	19,269	23,461	25,273
Miscellaneous	2,190,311	2,405,980	2,023,216	2,311,135	1,969,954	2,622,179	2,377,656	2,651,618	2,783,484	1,861,233
Totals	60,060,428	59,209,679	57,730,120	56,394,154	54,879,695	53,636,891	51,518,583	49,108,171	45,481,851	41,166,890

* The Government grants to Counties only are shown here.

a) All municipalities ; (b) townships, cities, towns and villages ; (c) counties ; (d) townships ; (e) counties, cities, towns and villages ;
 † Including \$20,246 grants from counties to local municipalities for roads and bridges.

FINANCIAL STATEMENT—CITIES OF UNITED STATES.

TABLE XVII. Statistics of some of the cities of the United States, selected from Bulletin No. 24, of the Department of Labor, Washington, D.C., issued September, 1899.

Cities.	Assessed valuation of property.				Property tax, collected 1898.	Debt.		Sinking Fund.	Expenditures for maintenance and operation.						
	Real.	Personal.	Total.	Total.		Bonded.	Floating.		Fire-department.	Waterworks.	Care of streets, including cleaning and sprinkling.	Parks and gardens.	Street lighting.	Police depart-ment.	Schools.
Albany, N.Y.	100,000	59,159,515	7,525,425	66,684,940	1,039,261	4,688,390	1,394,260	110,507	469,067	66,558	59,157	89,210	167,569	277,252	
Allegheny, Pa.	125,000	80,886,575	1,214,725	82,101,300	1,469,118	6,999,658	1,211,970	1,211,970	249,449	111,130	51,989		136,154	333,415	
Baltimore, Md.	541,000	291,350,389	31,754,363	323,104,752	6,360,380	37,570,638	5,399,720	175,565	818,519	369,767	350,931	399,550	844,576	1,406,114	
Boston, Mass.	355,463	200,283,900	203,865,518	1,036,699,418	13,750,840	82,505,971	28,373,736	1,170,098	1,330,876	1,235,113	333,883	333,276	1,689,449	2,467,379	
Buffalo, N.Y.	400,000	290,425,520	15,241,630	305,667,150	7,445,272	36,074,629	1,257,846	296,000	344,911	217,511	319,775	338,493	769,933	1,043,629	
Charleston, S.C.	68,000	12,801,478	5,094,063	17,895,541	442,179	3,399,550	1,350	42,000		42,761		39,000			
Chicago, Ill.	1,850,000	178,897,352	12,165,275	229,906,147	13,814,734	19,553,950	1,817,815	1,534,065	1,589,099	848,280	350,186	671,416	3,619,435	7,090,514	
Cincinnati, Ohio	445,000	159,525,490	40,213,500	199,738,990	4,106,360	31,084,894	5,379,261	474,167	1,741,929	260,808	49,591	336,779	659,965		
Cleveland, Ohio	389,000	104,632,280	37,358,900	142,991,180	3,244,279	13,639,314	2,335,314	434,366	291,566	135,366	76,266	210,432	385,477	1,032,883	
Denver, Col.	176,000	61,433,216		61,443,216	1,771,657	1,950,300	1,288,814	137,643	138,543	133,962	50,252	91,458	123,171	632,151	
Detroit, Mich.	350,000	169,087,969	297,636,869	466,724,838	3,415,818	13,957,500	35,356	517,076	110,819	564,514	50,799	49,215	500,530	827,708	
Duluth, Minn.	69,000	22,759,274	4,142,669	26,901,943	684,122	4,436,250	106,371	106,371	14,512	41,290	14,176	49,215	46,982	86,982	
Grand Rapids, Mich.	99,000	21,981,455	5,776,546	27,758,001	2,758,001	1,997,500	116,176	114,019	430,486	49,474		175,768	436,115		
Kansas City, Mo.	260,000	90,454,365	17,335,220	107,789,585	1,201,084	4,947,900	250,393	199,286	120,363	120,363	33,331	120,885	292,471	494,561	
Louisville, Ky.	295,000	129,338,698	24,970,769	154,309,467	3,380,648	6,288,750	566,850	399,031	131,699	226,630	108,134	169,499	339,049	656,391	
Milwaukee, Wis.	250,000	113,670	19,113,715	107,227,385	2,707,466	8,316,000	1,463,255	399,031	146,254	121,725	128,811	295,457	372,468	794,068	
Minneapolis, Minn.	275,000	111,979,294	26,333,395	138,312,689	2,761,267	14,113,000	3,433,039	351,251	805,652	118,809	22,064	80,093	196,569	378,720	
Newark, N.J.	110,000	102,316,105	36,874,678	139,190,783	2,948,546	14,420,329	295,029	297,480		291,723	6,320	297,480	226,113	439,063	
New Orleans, La.	285,000	227,673,166	516,319,679	743,992,845	2,948,546	14,420,329	99,036,292	297,480		291,723	6,320	297,480	226,113	439,063	
New York, N.Y.	3,500,000	1,023,316,105	36,874,678	1,060,190,783	2,948,546	14,420,329	99,036,292	297,480		291,723	6,320	297,480	226,113	439,063	
Omaha, Neb.	158,000	27,673,485	5,375,568	33,049,053	925,035	4,196,100	18,000	114,080	79,819	10,653	55,757	93,965	381,430		
Philadelphia, Pa.	1,240,263	802,891,670	1,711,365	804,603,035	15,076,725	51,241,295	16,078,000	1,004,469	1,155,206	978,000	554,288	1,162,391	2,716,920	3,467,755	
Pittsburg, Pa.	298,772	319,174,221	1,992,284	321,166,505	4,196,100	15,331,292	4,038,746	410,771	345,271	402,410	127,036	261,391	716,920	1,082,301	
Pittsford, N.Y.	92,417	38,396,620		38,396,620	392,263	5,660,336	35,754	98,393	32,759	64,055	9,896	76,493	463,574	1,082,301	
Portland, Oregon	166,000	142,139,200	39,127,920	181,267,120	2,857,027	17,381,000	1,256,688	351,782	84,124	210,128	39,132	290,891	351,624	570,343	
Providence, R.I.	105,000	45,065,155	23,194,093	68,259,248	994,226	7,228,683	272,888	103,435	103,435	262,218	33,700	97,925	120,170		
Richmond, Va.	175,000	101,897,375	10,895,615	112,792,990	1,968,971	8,620,385	148,277	221,128	163,435	986,252	138,029	225,476	951,399	496,640	
Rochester, N.Y.	625,000	398,512,800	44,140,100	442,652,900	4,921,301	19,503,385	398,000	7,123,631	531,085	165,011	44,845	111,144	100,004	139,555	
St. Louis, Missouri	215,582	78,523,015	14,509,467	93,032,482	1,934,483	8,201,100	569,020	179,841	60,106	165,011	44,845	111,144	100,004	139,555	
Salt Lake City, Utah	79,000	24,198,999	31,946,018	56,145,018	583,704	3,268,100	95,200	31,392	16,515	25,939	1,395	34,681	34,839	223,077	
San Francisco, Cal.	399,000	278,157,865	4,997,971	283,155,836	1,968,971	8,620,385	148,277	739,671	16,515	318,319	229,065	297,423	817,390	1,228,067	
Savannah, Ga.	65,000	24,929,795	10,500,650	35,430,445	548,611	3,275,950	49,022	74,363	43,736	165,412	12,950	98,579	86,531	126,996	
Syracuse, N.Y.	130,000	67,511,651	10,500,650	78,000,000	1,068,514	6,202,000	244,922	136,417	63,906	91,142	90,799	92,929	90,308	139,109	
Toledo, Ohio	112,000	38,109,751	12,448,920	50,558,670	1,068,514	6,202,000	244,922	136,417	63,906	91,142	90,799	92,929	90,308	139,109	
Washington, D.C.	287,432	185,397,252	5,693,690	191,090,942	3,193,863	15,888,200	713,916	232,264	181,672	388,498	25,969	299,433	627,395	1,006,186	
Wilmington, Del.	72,000	40,000,000		40,000,000	527,275	2,034,450	35,080	35,080	48,454	35,787	25,969	43,794	82,300	150,066	

* Not reported on account of re-organization of city

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REPORT OF THE BUREAU OF MINES

VOLUME VIII—FIRST PART

1899

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1899.

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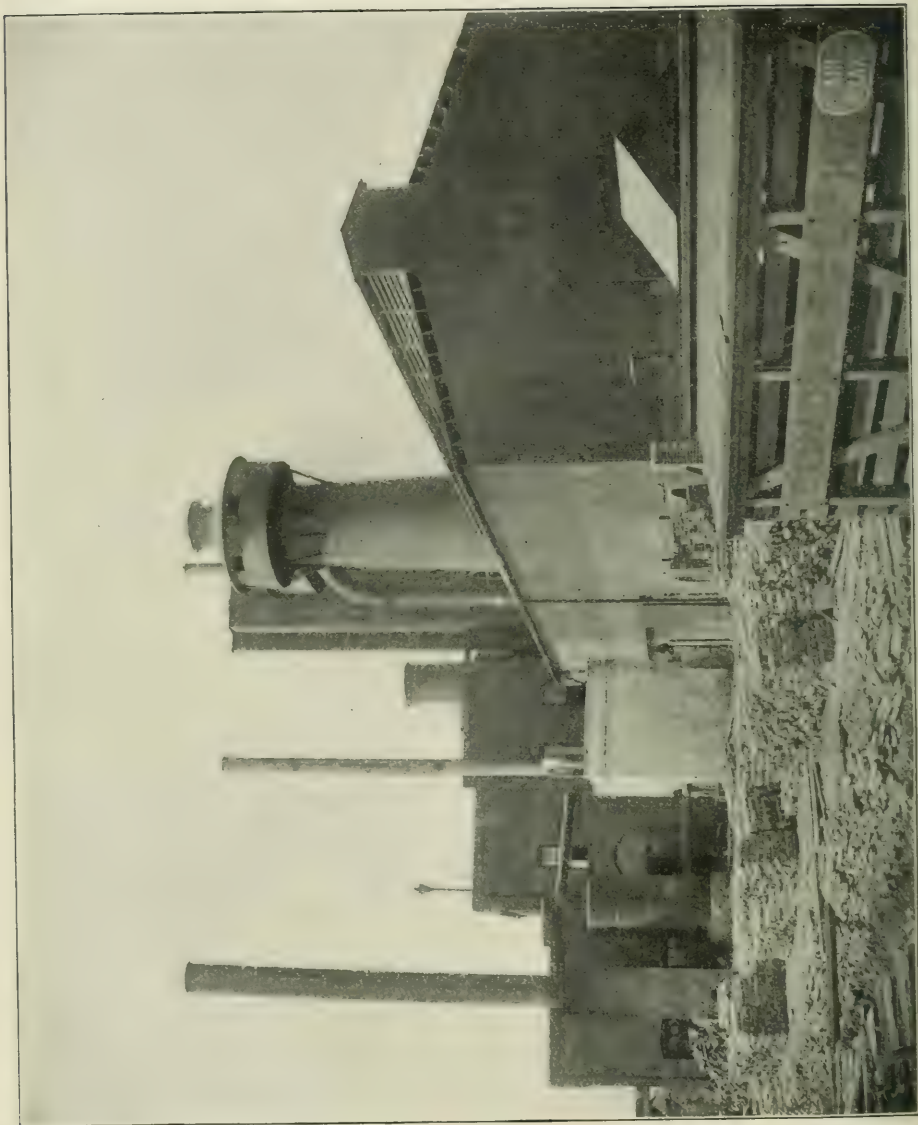
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EXPLANATORY NOTE

Owing to the termination of the Government printing contract, earlier publication of the Bureau's Report has been hindered this year, but the delay has permitted of the publication of statistics of metallic minerals for the first six months of 1899, which show a gratifying improvement on the statistics for the corresponding period of 1898.

August 1, 1899.

A.B.



DESERONTO BLAST FURNACE. BLOWN IN 25 JANUARY, 1900.

To His Honor SIR OLIVER MOWAT,
Lieutenant-Governor of Ontario.

SIR,—I have the honor to transmit herewith for presentation to the Legislative Assembly, the Eighth Report of the Bureau of Mines.

I have the honor to be, Sir,

Your obedient Servant.

J. M. GIBSON,

Commissioner of Crown Lands

DEPARTMENT OF CROWN LANDS

TORONTO, March 29, 1899.

The Honorable JOHN M. GIBSON,

Commissioner of Crown Lands.

SIR,—I beg to submit herewith, for presentation to His Honor the Lieutenant-Governor, the Eighth Report of the Bureau of Mines.

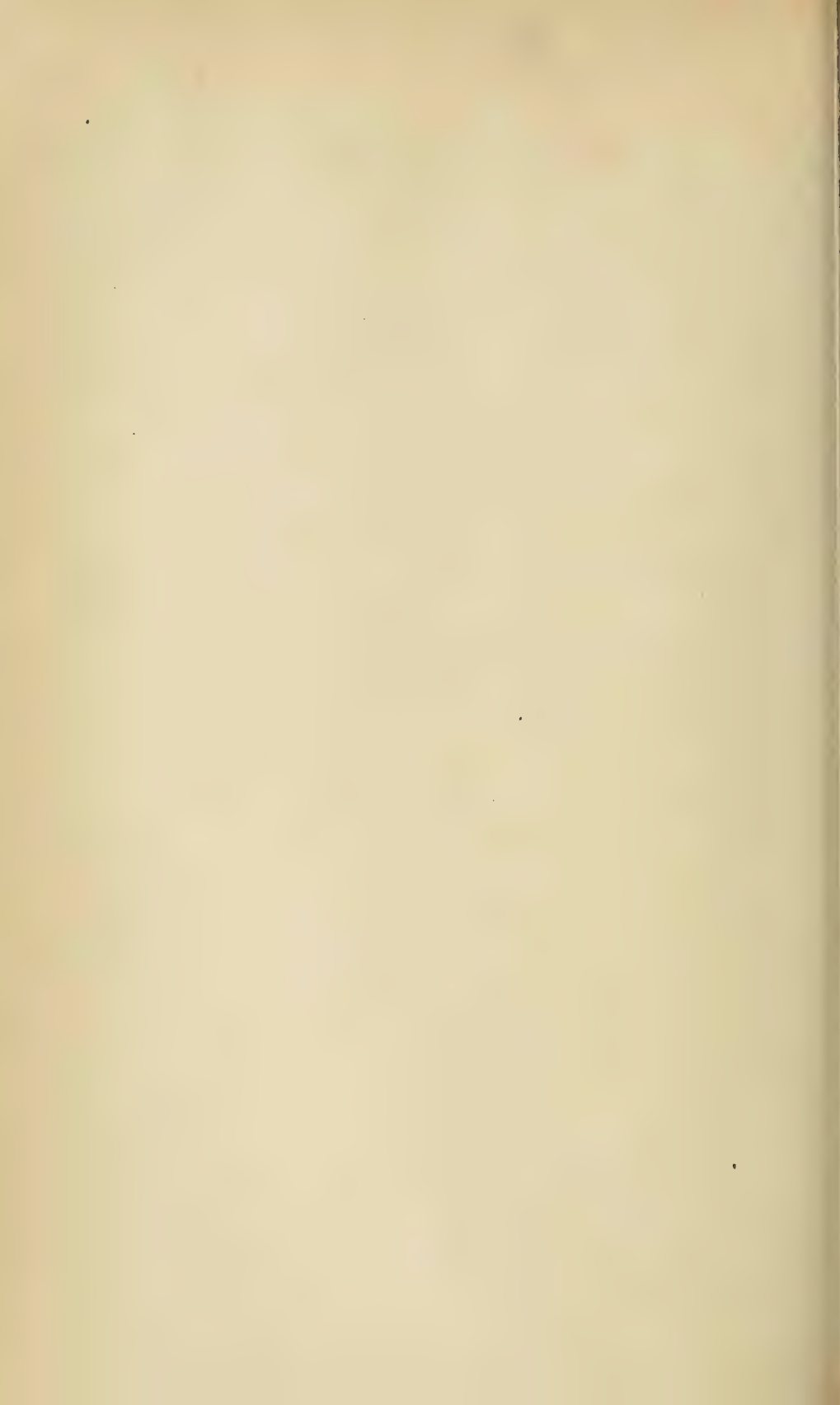
I have the honor to be, Sir,

Your obedient servant,

ARCHIBALD BLUE, Director.

OFFICE OF THE BUREAU OF MINES,

TORONTO, March 29, 1899.



REPORT OF THE BUREAU OF MINES

Vol VIII

1899

Part I

Introduction

THE RUSH for the incorporation of Mining Companies, which was so marked a feature of operations in 1897, was not maintained in 1898, although the number of charters issued was larger than in any preceding year since the Confederation of the Provinces excepting 1897. Following are the statistics for the first 28 years and for each of the last three years, inclusive of licensed companies :

Year.	No.	Capital.
		\$
1868-95	120	46,929,380
1896.....	26	15 600,000
1897.....	140	101,531,000
1898	49	30,762,998

The total number organized and licensed in the thirty-one years is 335, and the amount of authorized capital is \$194,823,378. Last year's companies make an eighth of the whole in number and a ninth in the amount of authorized capital, which is a good enough showing in spite of the record of the previous year.

The transactions in mining lands are shown in the following tables for the last seven years, being the statistics of lands sold and leased during each year of the period :

1. LOCATIONS SOLD.

Year.	No.	Acres.	\$
1892.....	65	6,200	15,273
1893.....	63	4,370	11,489
1894.....	40	3,271	7,646
1895.....	99	7,720	15,868
1896.....	140	10,734	22,084
1897.....	472	29,794	59,478
1898.....	292	19,529	40,469
Totals.....	1,171	81,618	172,307

2. LOCATIONS LEASED.

Year.	No.	Acres.	\$
1892.....	95	13,122	12,314 36
1893.....	122	13,047	11,933 90
1894.....	66	7,051	6,488 78
1895.....	175	15,084	14,924 00
1896.....	161	13,224	13,497 64
1897.....	783	86,014	84,821 35
1898.....	506	48,911	48,063 63
Totals	1,908	196,453	192,043 66

3. RENTAL OF LANDS PREVIOUSLY LEASED.

Year.	\$
1892	603 00
1893.....	2,735 86
1894.....	3,807 78
1895.....	3,287 16
1896.....	5,006 50
1897.....	6,241 11
1898.....	9,429 62
Totals.....	31,111 03

The total revenue from sales and rentals in the seven years has been \$395,460.66, being a yearly average of \$56,494.38, and for last year it has been \$97,962.25. For the period ending June 30 of the current year it has reached \$109,140, while for the same period of 1898 it was only \$44,880.

Classified by products, the mineral statistics of last year are as shown in the following table :

Products.	Value.	Em- ployés.	Wages.
	\$	No.	\$
Stone and Clay products	2,922,379	5,092	1,360,974
Oil, Gas and Carbide	2,328,110	666	311,310
Salt and Gypsum	282,886	206	62,629
Graphite and Mica	13,500	25	6,300
Metallic products : Iron, Nickel, Copper, Gold and Silver	1,689,002	1,506	723,026
Totals	7,235,877	7,495	2,464,239

The total value of mineral production in 1891 was \$4,705,673 ; in 1892, \$5,374,139 ; in 1893, \$6,120,753 ; in 1894, \$6,086,758 ; in 1895, \$5,170,138, and in 1896, \$5,235,003. In 1897 statistics of building materials were not collected, and for that year comparison of total products cannot be made. Last year's product exceeds in value any previous year, it being more than in 1891 by \$2,508,668, more than in 1896 by \$1,959,338, and more than the average of the six years 1891-6 by \$1,765,597. The value of metallic products for each of the eight years 1891-8 and the amount of wages paid for labor are shown in the next table :

Year.	Value.	Wages.
	\$	\$
1891.....	388,715	422,479
1892.....	864,382	366,513
1893.....	604,762	301,944
1894.....	842,750	349,751
1895.....	616,055	266,194
1896.....	963,288	385,361
1897.....	749,989	506,192
1898.....	1,689,002	723,026

The value of last year's product exceeds the average value of the seven preceding years by \$970,439 or 135 per cent., and the amount of wages paid for labor last year exceeds the average of the seven years by \$351,821 or 95 per cent. The wages paid for labor during the eight years is very nearly 50 per cent. of the total value of product.

Three years ago the iron industry of the Province awoke from a long sleep. Early in 1896 the new blast furnace at Hamilton was blown in, and from that time until the end of 1898 it smelted 165,653 tons of ore and 19,847 tons of mill cinder, and produced 100,566 tons of pig iron. The quantity of limestone used for flux during that period was 31,929 tons and of coke for fuel 108,565 tons. Employment was given to an average of 128 workmen, whose aggregate earnings were \$148,476, and the total value of pig iron at the furnace was \$1,172,697. This Company has been strengthened with the object of establishing steel works in connection with its blast furnace. On January 25 of the present year a new charcoal furnace erected at Deseronto was blown in, and for the first half of the year the two furnaces have produced 30,090 tons of pig iron valued at \$409,158, having smelted 14,452 tons Ontario ores, 35,510 tons foreign ores and 5,135 tons mill cinder. The quantity of iron ore mined in the Province during the first half of the present year has been 10,788 tons, valued at its selling price at the mines at \$20,604. The Canada Furnace Company, which has been carrying on operations for a number of years at Radnor, Quebec, will soon begin the erection of a charcoal furnace at Midland, in Simcoe county, which will have a capacity of 60 tons per day. The managers of the Company hope to complete it before the close of the year.

Gold mining began in an uncertain way in 1892, and although a number of mines and mills have been worked irregularly since then there are at present only seven which are steady producers of bullion, and three years ago there was only one which was

worked the whole year. During the three years 1892-3-4 the production ranged from \$32,776 to \$36,900. In 1895 it rose to \$50,781, in 1896 to \$121,848, in 1897 to \$190,244 and in 1898 to \$275,078. In the first half of the present year the value of bullion produced is \$224,995, and there is a good prospect of the year's production going over \$500,000. Last year the number of employés at the producing mines and mills was 580, and the amount of wages paid for labor was \$290,919; but of course a large proportion of the cost of labor was for development work. At non-producing mines the number of employés was much greater.

The quantity of nickel and copper ore smelted last year was greater than the average of former years by 56 per cent., and the total estimated quantity of refined metal in the matte product was 4,567,500 lb. nickel and 8,373,500 lb. copper, worth at the works \$782,300. The industry gave employment to an average of 637 men and the amount of wages paid for labor was \$315,500. During the first half of the current year the quantity of ore smelted was 88,123 tons, yielding 10,741 tons of matte which is estimated to contain 3,224,000 lb. nickel and 3,334,000 lb. copper, and the total value computed at the selling price of matte at the works is \$392,093. At the most extensive of the works in operation, those of the Canadian Copper Company, between 700 and 800 men are employed this year and five furnaces are in blast.

After the Toronto meeting of the British Association excursions were arranged so that British and foreign members of the Association might see more or less of the Dominion and become acquainted with its resources. The excursion of the mineralogists and geologists stopped for a day at Sudbury to permit of a visit to the nickel mines and smelting works of the region, the eminent metallurgist, Professor Roberts-Austen, now Sir William Roberts-Austen, accompanying the party to that point. That he was impressed with the extent and importance of our nickel deposits has been proved by his account of them in lec-

tures and papers since his return to England. His paper on the "Extraction of Nickel by the Mond Process" is opportune just now, when the question of refining our nickel in our own Province is under discussion. The Mond process has been known to chemists since 1895, and the interesting experiment of forming a volatile compound with nickel and carbon monoxide from which metallic nickel could be deposited has been repeated in many laboratories; but to adapt the process for use on a commercial scale so as to compete with other methods of refining the metal demanded a large expenditure of time and money. It is very encouraging to see that so distinguished an authority on metallurgical methods as Sir William Roberts-Austen looks on the process as far enough advanced to justify a careful study and description, with the conclusion that it will compete favorably with any now in use. If the cost of the refined nickel can be materially reduced its valuable qualities as a metal and also in its alloy with steel should bring it into great demand, and give a corresponding impetus to one of our most important mining regions. The paper is reproduced in this Report with the kind permission of the author, and it possesses special interest to us in view of the likelihood of Mr. Mond becoming an extensive owner and operator of nickel and copper properties in the Sudbury region.

A number of amendments made to the Mines Act during the last session of the Legislature will, it is hoped, help in a substantial way to advance the mining industries of the Province. The terms of the Iron Mining Fund have been modified to encourage the use of charcoal or peat fuel, by providing for payment of fifty cents per ton on the product of ores not mined in Ontario when such fuel is used solely in smelting ores; but subject to the condition that in the first period of two years not less than twenty per cent. of Ontario ores is reduced at the furnaces claiming aid, and after two years not less than forty per cent., after four years not less than sixty per cent., after six years not less than eighty per cent., and after eight years not less than a hundred per cent.

Payment on the proportional product of Ontario ores, however, is to be on the basis of one dollar per ton of pig metal. A second amendment provides for staking out mining locations in unsurveyed territory which is shown to the satisfaction of the Commissioner of Crown Lands to have no value for pine timber. An explorer who has taken out a license, for which the fee is \$10, may stake out in any calendar year two locations of forty acres each, and may hold them, without survey or payment of price or rental, for a period of two years, subject to an expenditure of \$3 per acre in the first year and of \$7 per acre in the second year for actual mining work. Then, if the development is satisfactory, he may proceed in the usual way to apply for and acquire a location. The advantage of this provision of the Act is, that the prospector is not required to expend money for survey or purchase until he has had an opportunity of proving the mineral worth of the land. A third amendment fixes a new tariff of prices of lands, which is made uniform for all parts of the Province, dependent only upon the lands being in surveyed or unsurveyed territory and their distance from railway communication. In the case of leased lands, the term is limited absolutely to ten years, and if the yearly rental has been paid and if all the covenants and conditions of the lease have been fulfilled, the lessee will be entitled to a patent for his location; or he may obtain a patent at any time upon pay-

ment of rent and performance of the covenants and conditions for the full period of the term. In effect, this amendment affords an easy method of purchase by annual payments at a rate which in the aggregate is but little more than the cash price. Some changes have also been made in the provisions of the Act which relate to claims in Mining Divisions, the most important of which are that instead of development work being reckoned at a specified number of days each year it is required to consist of an expenditure of \$150 per year, computed at the rate of \$2 per man per day, and that when surveys are being made for a patent or lease the boundary lines are to follow the courses of the lines of a claim as originally staked out and recorded, or as they may have subsequently been altered, changed or corrected by the Inspector of the Mining Division. Before a patent or lease can be acquired for a claim, however, the yearly working conditions must be completed for four years on a claim of twenty chains square and for three years on a claim of fifteen chains square or less (or the equivalent of these conditions in a less period of time), and the full performance of the necessary working conditions when certified by the Inspector entitles the holder of the claim to exemption from any further working conditions, renewal fee or miner's license to work the claim with or without a patent or lease for the land.

MINERAL INDUSTRIES OF ONTARIO

Statistics of 1898

Mining Companies

In last year's Report of the Bureau a list was published of all Mining Companies organized under the laws of Ontario for the thirty years ending with 1897, or since the Confederation of the Canadian Provinces. The list which fol-

lows gives the name, date of charter and authorized capital of all Mining Companies, Limited, to which charters were granted during the year 1898.¹

¹ In the case of three of the Companies the Orders in Council (which fix the dates of charters) were passed in December, 1897, but the Gazette notices were not published until 1898.

Mining Companies Incorporated in 1898.

Name of Company.	Date of Charter.	Capital.
The Buffalo Mining and Development of Rat Portage	23 Dec., 1897	\$1,500,000
The Buffalo Northwestern Gold Company of Ontario.	9 April, 1898....	1,000,000
The British Lion Gold Mining and Development Co. of Ont.	27 April, 1898....	80,000
The Bonheur Belle Gold Mining Co. of Northwestern Ontario..	27 April, 1898....	500,000
The Bad Vermilion Gold Company of Ontario	23 March, 1898 ..	20,000
The Boerth Mining Company of Ontario.....	23 Nov., 1898	1,225,000
The Calder Lake Mining Company of Ontario.....	12 Jan., 1898	100,000
The Cobb Gold Mining Company of Ontario.....	15 June, 1898....	1,500,000
The Decca Mining Company of Ontario.....	23 March, 1898 ..	975,000
The Duluth Mining Company of Ontario	9 April, 1898....	30,000
The Elzevir Mining and Development Company.....	11 July, 1898	199,000
The Gore Lawn Mining and Development Company	15 Jan., 1898	20,000
The Golden Dredge Mining Company of London, Canada.....	5 March, 1898 ..	80,000
The Hattie Belle Gold, Copper and Nickel Co. of Parry Sound..	11 July, 1898	400,000
The JO41 Gold Mining Company of Rainy River	8 Jan., 1898	500,000
The Kaladar and Anglesea Mining and Devel't Co of Kingston.	9 March, 1898 ..	400,000
The Leadville Mining Company of Toronto.	16 March, 1898 ..	24,000
The Lake Manitowick Gold Mining and Development Company.	14 Oct., 1898....	999,999
The Mountain Mining Company of Ontario	12 Jan., 1898	499,000
The Muskoka Gold Mining and Development Company.....	10 Jan., 1898	99,000
The Muskoka Beaver Mining Company.....	5 March, 1898 ..	490,000
The Northern Giant Mining Company	29 Jan., 1898	400,000
The Olive Gold Company of Seine River.....	13 Dec., 1897	1,000,000
The Onaping Gold Mining Company of Ontario.....	15 June, 1898....	490,000
The Pontiac Mining Company of Ottawa	10 Dec., 1898	490,000
The Sheba Gold Mining and Development Company of Ontario.	23 Dec., 1897	495,000
The Sentinel Consolidated Gold Mining of Ontario.....	29 April, 1898....	250,000
The Snake River Mining Company	5 Oct., 1898	2,500,000
The Seneca Gold, Copper and Nickel Mining Company	31 August, 1898..	999,999

Name of Company.	Date of Charter.	Cap. tal.
The Triggs Gold Mining Company of Ontario.....	12 July, 1898...	\$500,000
The Tycoon Mining and Development Company of Ontario ..	13 Sept., 1898....	150,000
The Voss Mining Company of Ontario.....	14 Oct., 1898....	10,000
The Windsor-Yukon Mining Company.....	10 March, 1898 ..	45,000
The Wawa Gold Mining Company of Michipicoton	29 April, 1898....	199,000
The Wallingford Gold Mining Company.....	17 Sept., 1898....	750,000
The Westminster Mining Company of Ontario	31 May, 1898....	195,000
The Wahnapiatae Gold Fields Company.....	9 June, 1898....	1,250,000
The Yukon-Klondike Co-operative Mining Company of Ontario.	11 Jan., 1898....	300,000
The Zenith Gold Mining Company of Ontario.....	9 March, 1898 ..	98,000

The total number organized and chartered during the year is 41, and the aggregate of their authorized capital is \$20,862,-

A comparative Statement.
998. In the preceding year the number was 136, and the aggregate of their authorized capital \$98,356,000. Since Confederation the total number organized has been 327, with an aggregate authorized capital of \$184,923,378. Besides those to which charters were granted last year, licenses were issued to the following companies authorizing them to sell stock and other securities in Ontario under the provisions of the Act for the Incorporation and Regulation of Mining Companies, viz.:

The Canadian Minerals Co.....	\$500,000
The Canadian Gold Fields Co	750,000
The Cedar Island Gold Mining Co.	500,000
The Clearwater Gold Mining Co.....	1,000,000
The Joseph Ladue Gold Mining Co.	5,000,000
The Minnehaha Gold Mining Co	1,000,000
The Ontario Gold Concessions.....	400,000
The Regina (Canada) Gold Mines....	750,000

All are limited companies, with an aggregate capital of \$9,900,000. Several of these are operating under foreign charters in British Columbia and the Yukon territory, but the two last named have been working in Ontario.

Mining Lands.

In 1898 the Crown disposed of 292 mining locations by sale, having a total area of 19,529 acres, and of 506 locations by lease with an area of 48,911 acres. The revenue derived from lands sold in the year was \$40,468.87, from lands leased \$48,063.63, and from lands leased in the preceding six years \$9,429.62, or a total of \$97,962.12. For the seven years 1892-8 the number of mining locations sold

has been 1,171, with an area of 81,618 acres, and the number leased has been 1,908 with an area of 196,453 acres,—being in all 3,079 locations with an area of 278,071 acres. The revenue derived from lands sold during the seven years has been \$172,307, and from the first year's rent of lands leased \$192,043.66. Adding rents paid subsequent to the first year of leases (\$31,111.03), the total revenue from lands sold and leased has been \$395,461.69, which together with miners' licenses, fees, etc., collected in the Michipicoton Mining Division in 1897-8 (\$6,244.50) make an aggregate for the seven years of \$401,706.06, or an annual average of \$57,386.58. The following tables give details by districts of mining lands sold and leased in 1898.

Mining Lands Sold.

District.	Sales.	Acres.	\$
Rainy River.....	255	14,650	30,816
Thunder Bay....	9	1,171	2,804
Algoma	1	126	252
Elsewhere	27	3,582	6,597
Totals	292	19,529	40,469

Mining Lands Leased.

District.	Leases.	Acres.	\$
Rainy River.....	40	40,500	40,534 17
Thunder Bay....	20	3,419	3,419 00
Elsewhere ...	46	4,992	4,110 46
Totals....	506	48,911	48,063 63

Summary of Mineral Production in 1898

Quantity and value of mineral production in 1898, with number of workmen employed and amount of wages paid for labor.	Product.	Quantity.	Value.	Employés.	Wages.
			\$		\$
	Building stone, rubble, etc.....		750,000	1,250	520,000
	Cement, natural rock... barrels	91,528	74,222	85	23,784
	Cement, Portland.. .. "	153,348	302,096	220	104,350
	Lime bushels	2,620,000	308,000	548	127,000
	Drain tile number	22,668,000	225,000	2,622	456,000
	Common brick. "	170,000,000	914,000		
	Pressed brick and terra cotta "	8,969,868	100,344		
	Sewer pipe		93,717	77	26,260
	Pottery		155,000	164	61,000
	Petroleum imperial gal.	26,978,977			
	Illuminating oil.... "	12,281,622	1,243,490	546	263,455
	Lubricating oil.. . . "	2,043,226	202,150		
	Benzine and naptha. "	1,240,967	121,840		
	Gas and fuel oils and tar "	8,047,441	286,705		
	Paraffin wax and candles .. lb.	2,616,086	116,349		
	Natural gas		301,600	85	31,457
	Carbide of calcium tons ¹	1,040	55,976	35	16,398
	Salt "	59,385	278,886	191	60,629
	Gypsum "	3,000	4,000	15	2,000
	Graphite..... "	300	6,000	10	1,800
	Mica "	34	7,500	15	4,500
	Iron ore "	27,409	48,875	100	26,700
	Pig iron "	48,253	530,789	130	61,476
	Nickel..... "	2,283 ³ / ₄	514,220	637	315,501
	Copper. "	4,186 ³ / ₄	268,080		
	Gold oz	16,261	275,078	580	290,919
	Silver..... "	86,600	51,960	59	28,430
	Totals		7,235,877	7,495	2,464,239

¹ Net tons of 2,000 lb.

Building Materials and Clay Products.

Statistics of building materials were not collected for the year 1897, and for that year

the comparative tables which follow for the period 1891-8 are incomplete. The years of depression had seriously affected the building

trade, and production fell off steadily for some time. But with the revival there is a brisker demand for building materials, and it is noticeable also that there is a more generous response to the request for statistics.

The total number of men employed in the production of building materials last year was 4,611, the amount of wages paid for labor was \$1,168,240, and the value of materials produced was \$2,378,611. In these statistics cement is not included. This industry employed last year 305 men, with wage earnings of \$128,134, while the value of the product of their labor was \$376,318.

The following table gives the value of the products of stone quarries and the amount of wages paid for labor for each year of the period 1891-8, exclusive of 1897:

	Year.	Value.	Wages.
Statistics of Stone Quarries		\$	\$
	1891.....	1,000,000	520,000
	1892.....	880,000	730,000
	1893.....	721,000	464,000
	1894.....	554,000	336,700
	1895.....	438,000	296,000
	1896.....	594,000	273,000
	1898.....	750,000	520,000

The number of men employed at the quarries last year was 1250, or 480 more than in 1896.

Brick and tile works are correspondingly active, and the output of the yards is but little short of the best year in the decade. Following are the figures of production and value for the seven years, and the amount of wages paid for labor—the quantities of brick and tile being given in millions:

	Year.	Brick M.	Value.	Tile M.	Value.	Wages.
Statistics of Brick and Tile.			\$		\$	\$
	1891.....	160,000	950,000	7,500	90,000	482,000
	1892.....	175,000	980,000	10,000	100,000	445,000
	1893.....	162,350	932,500	17,300	190,000	451,000
	1894.....	181,500	690,000	25,000	280,000	388,000
	1895.....	126,245	705,000	14,330	157,000	364,000
	1896.....	105,000	577,000	13,200	144,000	306,000
	1898.....	170,000	914,000	22,668	225,000	456,000

The number of workmen employed in brick and tile yards was 2,622, or nearly 800 more than in 1896.

Separate statistics are given for pressed brick and terra cotta, and as will be seen by the following table for the eight years 1891-8 there is little sign of revival in the production of these materials. Two or three of the works had been closed down owing to lack of demand for pressed brick, but work has been resumed at one or two of these and it is likely that the output of this year will show an increase.

The number of men employed at the works last year was 114, being 29 less than in 1897.

The statistics of lime production show an increase in proportion to those of other building materials, and very nearly approach the highest figures of the decade. They are as follows for seven years of the period:

	Year.	Bushels.	Value.	Wages.
Statistics of Lime			\$	\$
	1891.....	2,350,000	300,000	116,000
	1892.....	2,600,000	350,000	120,000
	1893.....	2,700,000	364,000	122,000
	1894.....	2,150,000	280,000	108,000
	1895.....	2,090,000	280,000	104,000
	1896.....	1,880,000	220,000	85,000
	1898.....	2,620,000	308,000	127,000

The number of workmen employed last year was 548, or 118 more than in 1896.

The manufacture of sewer pipe last year gave employment to 77 men, whose aggregate wages were \$26,260, as compared with 64 men and \$19,600 for labor

Statistics of Sewer Pipe.

	Year.	No.	Value.	Wages.
Statistics of Pressed Brick and Terra-cotta.			\$	\$
	1891.....	13,617,909	156,699	58,000
	1892.....	22,048,000	259,335	88,865
	1893.....	21,634,000	217,373	80,686
	1894.....	25,456,000	286,230	95,400
	1895.....	17,940,867	184,550	69,442
	1896.....	12,201,000	129,845	60,824
	1897.....	8,043,908	99,277	40,084
	1898.....	8,969,868	100,344	42,560

last year. The value of sewer pipe produced was \$93,717, or \$20,166 more than last year.

Cements.

Very satisfactory progress continues to be made in the production of cement, but especially the Portland variety of it. There has been substantial improvement in the output of the

Portland
and Natural
Rock
Cements

natural rock cement works during the past four years, but values are not so well maintained as is the case with Portland cement, and the rate of increase is considerably lower in the number of workmen employed, in the amount of wages paid for labor and in the quantities produced. The following table gives the statistics of the industry of the last five years :

Schedule.	1894.	1895.	1896.	1897.	1898.
Natural rock cement—					
Number of works	5	5	5	4	4
Number of workmen	43	45	56	70	85
Wages for labor \$	13,020	14,166	15,200	21,500	23,784
Product bbl.	55,323	55,219	60,705	84,670	91,528
Value of product \$	46,174	45,145	44,100	76,123	74,222
Portland cement—					
Number of works	3	2	2	2	2
Number of workmen	105	129	120	161	229
Wages for labor \$	31,858	46,000	48,400	67,560	104,350
Product bbl.	30,580	58,099	77,760	96,825	153,348
Value of product \$	61,060	114,331	138,230	170,302	302,096

The average rate of wages in natural rock cement works rose from \$207 to \$315 during the period and in Portland cement works from \$303 to \$451, while for both classes of works the aggregate of wages paid for labor grew from \$44,878 in the first year to \$128,134 in the last, being an increase of 185 per cent. The product of all cement works has grown from 85,903 barrels in 1894, valued at \$109,834, to 244,876 barrels in 1898, valued at \$376,318, being an increase of 173 per cent. in quantity and of 243 per cent. in value. There has been a slight fall in values per barrel, the average of natural rock being 88 cents in 1894 and 81 cents in 1898, while the average of Portland in 1894 was \$2 and in 1898 \$1.96. The statistics of Portland cement for 1898, it should be stated, includes 18,400 barrels of Silica Portland, valued at \$32,200, which accounts for the apparent fall in value per barrel of Portland.

But although the production of cement in Ontario is steadily growing larger, there is no falling off in the quantity of imports for all Canada. The following statistics show for the five years 1894-8 the values of imports entered for consumption from Great Britain, the United

States and Other Countries :

Year.	G. B.	U. S.	O. C.	Totals.
1894	\$182,974	\$33,253	\$68,234	\$284,471
1895	135,693	21,103	95,130	251,926
1896	121,125	25,997	107,907	255,029
1897	111,551	45,200	104,081	260,832
1898	106,518	59,855	200,574	366,977

It will be noticed that the trade has undergone a marked change in this short period of four years, the imports from Great Britain having fallen off from 64 to 29 per cent. of the whole, while those from the United States have increased from 12 to 16 per cent. and from all other countries from 24 to 55 per cent. of the whole. Practically all imports, except those from Great Britain and the United States come from Belgium and Germany, the former having last year supplied cement to the value of about \$150,000 and the latter to the value of about \$50,000. The amount of duty paid was \$124,808.65, being \$121,968.58 on Portland and \$2,900.07 on all other kinds. The total quantity imported last year, including what was not entered for consumption, was 1,153,640 cwt. of Portland and 11,713 cwt. of other kinds.

Pottery.

The pottery works of the Province gave employment last year to an average of 164 men, whose earnings were \$61,000. The value of products was \$155,000.

Petroleum and Natural Gas.

The total quantity of crude petroleum distilled last year was 26,978,977 imperial gallons, worth at the average price of crude \$1,122,801. This was in

quantity 1,422,386 gallons and in value \$55,753 more than for the previous year. During the first half of the year six refineries were in operation, owned by five separate companies; but during the second half the business was practically in the hands of two companies, viz., the Imperial of Petrolia and the Bushnell of Petrolia and Sarnia, and it is now in one. The following table gives the quantities and values of distilled products for the years 1897 and 1898:

Products.		1897.		1898.		
Illuminating oil	gal.	10,891,337	\$1,131,083	gal.	12,281,622	\$1,243,490
Lubricating oil	"	1,959,810	199,755	"	2,043,226	202,150
Benzine and naphtha	"	949,341	77,340	"	1,240,967	121,840
Gas and fuel oils and tar	"	8,021,633	281,035	"	8,047,441	286,705
Paraffin wax and candles	lb.	2,139,278	88,378	lb.	2,616,086	116,349

In 1897 the total value of distilled products was \$1,777,591, and in 1898 it was \$1,970,534. In 1896 the value of distilled products was \$832,187 more than the value of crude, being an appreciation by treatment of 74 per cent. In 1897 the appreciation was \$710,463, or 67 per cent., and in 1898 it was \$847,733, or 75½ per cent. Last year it was supposed that the lower rate of appreciation in 1897 was a result of tariff changes, but this view is not supported by the statistics of 1898. The average rate of wages was lower last year than in either of the previous years,

being \$482.68 against \$540.83 in 1897 and \$541.33 in 1896; but no doubt this is a consequence of a closing down of three of the plants in the latter part of last year. The average number of workmen employed at the refineries was 546 and the amount paid for labor \$263,516. In 1897 the number was 364 and the amount paid for wages \$196,965.70.

The proportion of refined products obtained from the crude is shown in the following table for the seven years 1892-98, and indicates in a general way the progress that has been made in the processes of distillation during that period:

Product.	1892. p. c. of crude.	1893. p. c. of crude.	1894. p. c. of crude.	1895. p. c. of crude.	1896. p. c. of crude.	1897. p. c. of crude.	1898. p. c. of crude.
Illuminating oil...	38.67	39.12	41.10	43.31	45.08	42.62	45.52
Lubricating oil...	12.35	12.45	10.91	9.51	9.07	7.67	7.58
All other oils.....	27.34	28.14	30.45	28.07	31.09	35.10	34.42
Totals	78.36	79.71	82.46	80.89	85.24	85.39	87.52

In the seven years the increase of all refined products obtained from the crude has been 9.16 per cent, made up of 6.85 per cent. in illuminating oil and 7.08 per cent. in all other oils except lubricating; in the latter there has been a decrease of 4.77 per cent. The wax product last year was larger than in 1897 by 476,808 lb., and larger than in 1896 by 1,084,415 lb. There is perhaps no other industry in the country in which such mark-

ed and satisfactory improvement has been made as in the oil industry, and those employed in it deserve great praise for the intelligent methods they have so diligently pursued.

A great deal of exploring and development was carried on during the year for supplies of crude, and the situation was improved in consequence. A small field north of the London road in Sarnia township has been

Exploring
and develop-
ing New
Fields.

added to the producing territory. The southern part of the township of Plympton has also given good results, although in these two localities the oil deposit is not quite so uniform as in the old districts of Petrolia and Enniskillen. It was thought last summer that the township of Brooke gave evidence of a good deposit, and quite a number of wells were drilled there; but the supply did not prove to be permanent and most of the wells have been abandoned. In the township of Zone, near Thamesville, the same experience was realized; several wells yielded liberally when first drilled, but the flow did not last. Bothwell is getting its producing limits as an oil field defined, and during the year its yield was little more than 6,000 barrels monthly. Euphemia and Dawn have each a small field, the area of which is being expanded by exploration. In the old territory, which runs from the southern part of the township of Sarnia in a southeasterly direction through Enniskillen by way of Petrolia, wells may be struck at nearly every attempt. Small detached areas in this region not previously explored give good returns, one of the best being near Oil Springs. It takes time, experience and risk of loss to discover these treasures of Nature's storehouse, but it is not improbable that anywhere throughout the counties of Lambton, Kent and Essex a discovery of oil may be made.

A new locality that has recently been attracting attention as an oil field is in the southern part of Dunwich town-

Develop-
ment work in
Dunwich.

ship, in Elgin. Two years ago a

show of oil was obtained on lot 15 in the ninth concession, near the shore of lake Erie, by a farmer who was boring for water. A syndicate of Dutton capitalists

Dutton
Syndicate.

was formed, and a new well was commenced on lot 15 in the tenth concession. After going through 184 feet of drift to the rock, a surface deposit of oil was struck which for a few days yielded at the rate of two barrels per day. The services of an experienced driller were then procured and drilling was commenced on the north side of the same lot, close to the Talbot road, at an elevation of about 80 feet above

lake Erie. The record shows that the drift is composed of 130 feet of blue clay holding many boulders of granite and some limestone, followed by 52 feet of hardpan and gravel. The drilling was continued to a depth of 687 feet, being 505 feet in the rock. A bed of oil-bearing rock 10 feet in thickness was cut through at 332-342 feet, and a second one of the same thickness at 400-410 feet from the surface. From the first of these beds 500 barrels of oil was pumped, and after packing this source of yield the second bed gave one barrel per hour for a test of twenty hours. A small flow of gas was struck at 550 feet, and the rock from 650 to 687 feet yielded a greenish bitter water that flowed over the top of the casing. Cuttings from this well have been examined by Dr. Coleman, who has made the following report on them—the depth of samples being reckoned from the surface of the rock:

60 ft. Pale yellowish brown limestone, with a fragment or two of dolomite.

111 ft. Pale gray and also white fragments, limestone with some shaly matter.

130 ft. Shaly limestone, yellowish brown.

140-145 ft. Grayish white limestone.

162 ft. Brownish gray, somewhat porous dolomitic limestone, with some sandy particles.

165 ft. Brown limestone with a little sand.

175 ft. Brownish gray limestone.

346 ft. Limestone with some shaly matter, yellowish brown with white particles.

362 ft. Dolomite, grayish white, with what appear to be portions of fossils.

452 ft. Dolomite, bluish gray and also white fragments.

501 ft. Dolomite with gypsum, bluish white.

No. 2 well was drilled on lot 15 in the ninth concession, about 1000 feet north of No. 1. It was put down to a depth of 410 feet, and gave a little showing of gas but no oil. No. 3 was located on the southern part of lot 14 in the tenth, where the surface is about 60 feet below the level of No. 1. The thickness of drift was 140 feet, and the well was drilled to 347 feet. A small show of oil was obtained at 135 to 140 feet in the rock, and about 10 feet of fair cuttings at the bottom. It was pumped ten hours, and then plugged and abandoned. A company known as the Elginfield Company was then organized to continue operations,

Elginfield
Company.

and No. 4 well was commenced 300 feet south-east of No. 1, on the same level. The drift had a depth of 190 feet and the rock formations were the same as in No. 1. The oil deposit on the surface of the rock gave two barrels per day. At 410 feet a great flow of salt water was struck and the well was abandoned. No. 5 was located on lot 15 in the tenth, 200 feet northwest from No. 1. The drift was 179 feet, and from the bottom of it 500 barrels of oil was pumped. Cuttings of oil rock were obtained from the depths of 150 and 205 feet in the rock, but they were dry. This well was drilled to 415 feet. No. 6 was bored on lot 13 in the eleventh concession, about 30 feet from the west line of the lot. Here the thickness of the drift was found to be 287 feet, consisting of 130 feet clay, 157 feet gravel and sand. Gas was found in the upper bed of gravel, underneath the clay. After drilling through 30 feet of shale and 155 feet of limestone a small flow of oil was struck, which yielded one barrel per day. No. 7 is on the same lot as No. 6, about 500 feet east of it and on the same level. The drift is 260 feet deep, and at 140 feet yielded a strong flow of gas in the gravel. The next eight wells of the Company, all bored last year, are on lot 14 in the tenth concession. Upon the level the drift has a uniform thickness of 205 feet, but some of the wells are located on the side of a hill and there the depth of drift is not so great. Oil was struck in each of the wells at 150 to 160 feet in the rock, the oil cuttings measuring 16 feet, and the average yield of oil is two barrels per day. On the west side of the same lot two wells were drilled during the latter part of the year, on the same general level. The depth of drift was 240 feet, and of limestone to oil-bearing rock 155 feet. The thickness of the oil bed was found to be 20 feet, and while the wells started at 15 to 20 barrels per day they have declined to four barrels.

Henry Hollingshead & Son of Dutton are operating on the west side of lot 15 in the tenth concession, and on the west

Hollingshead
and Son.

half of 13 in the same concession. They began boring in September, 1898, in a gully about 40 feet below the level of the ground on the first named lot.

No. 1 well was drilled through 131 feet of drift, composed of 80 to 90 feet of clay, and the rest sand and gravel, and then through 160 feet of limestone. Oil was struck at 152 feet in the limestone and the well started at three barrels per 12 hours. In No. 2, which is 400 feet northwest of No. 1, the depth of drift was 129 feet. Oil cuttings were got at 160 feet in the rock, about one foot in thickness. The drilling was continued to a depth of 358 feet, when salt water was struck which flowed to the surface the full capacity of the pipe. This was shut off with difficulty and a pump was put in, but the yield of oil was only one barrel per 12 hours. No. 3 well is 300 feet northwest of No. 2, in the same gully. The drift was 129 feet, and oil was struck at 160 feet in the rock. The drill was continued for 20 feet through alternate bands of oil-rock and dry limestone, when the hole was shot and brackish water broke in under strong pressure. The well has been plugged to the surface. No. 4 is on the west side of lot 13 in the tenth, about 300 feet from the west line and just south of the Talbot road. The surface has a depth of 270 feet, and the drill has gone 178 feet into the limestone. At 161 feet in the rock oil cuttings began to show and they continued for 17 feet. This well was finished on 27 January of the present year, and it has yielded five barrels per 12 hours.

At the end of January six wells on the Smith farm and two on the Backus farm were worked by the Elginfield company

and were yielding 12 barrels per day of 10 hours. All the pumps were driven by one engine with 25 h.p. boiler, and power was also supplied to two pumps of the Hollingshead wells. The total quantity of crude shipped to Petrolia refineries in 1898 was 28 carloads, averaging 105 barrels per car, and selling at \$1.40 per barrel. Teaming from the wells to Dutton station costs 15 cents and freight from Dutton to Petrolia six cents per barrel.

The cost of drilling a well with casing and pump complete ranges from \$600 to \$700 for a well of 430 to 450 feet deep, and the time occupied is about 250 hours.

The natural gas statistics differ but slightly

from those of 1897. The number of producing wells bored during the year was 14, and of non-producing wells five, but the total number of producing wells only shows an increase of two. An extension of 18½ miles was made to the length of pipelines for distribution of gas, yet the value of

Statistics of
Natural Gas.

gas supplied for consumption was less than in the previous year by nearly \$7,000. The amount of wages paid for labor was also less by nearly \$11,000, owing, it is probable, to the smaller number of men employed in drilling wells. Following are the statistics of the last six years :

Schedule.	1893	1894	1895	1896	1897	1898
No. of producing wells..	107	110	123	141	140	142
Miles of gas pipe.	117	183½	248	287½	297	315½
Workmen employed ...	59	99	92	87	84	85
Value of gas product...\$	238,200	204,179	282,986	276,710	308,448	301,599
Wages for labor	21,592	53,133	73,328	47,527	42,338	31,457

The number of companies which own natural gas wells is now 15, and nearly all the wells are in the counties of Welland, Haldimand and Essex. There are a number of small wells in Elgin, where the source of supply is in the drift, but their returns are not included in the statistics of the table.

Calcium Carbide.

For the thirteen months ending December 31, 1897, the product of the Willson Carbide Works Company at Merritton was 574 tons of calcium carbide, valued at \$34,410, the average number of workmen employed being 30 and the amount of wages paid for labor \$12,544.62. Last year the product of the works increased to 1,040 tons, valued at \$55,976, the average number of men employed was 35 and the amount of wages paid for labor was \$16,397.95. The only interruption to operations during the year was caused by a cyclone which swept over the town and destroyed a number of buildings, among them being one

The Carbide
Works at
Merritton.

of the power-houses of the Company. The damage to the power-house was quickly repaired, however, and meantime the mill and furnace were run at a reduced capacity.

The demand for calcium carbide continues to be very satisfactory, more indeed than the Merritton factory has been able to supply. But although this is the case the selling price at the works has been reduced by \$6 per ton. Further reductions will no doubt be made when larger works are erected and more experience is gained in processes of manufacture. Important advances are likely to be made during the present year as a result of recent methods and tests.

Salt and Gypsum.

The number of salt works in operation last year was the same as in 1897, namely, six in Huron, one in Bruce, one in Middlesex, two in Lambton and one in Essex. The statistics of the industry for the past seven years are given in the following table :

Statistics of
seven years.

Schedule.	1892	1893	1894	1895	1896	1897	1898
Tons made	43,387	48,450	35,215	51,009	44,816	54,636	59,885
Value	\$ 162,700	149,850	115,551	188,101	204,910	249,880	278,886
Wages..	37,800	44,440	43,350	56,496	50,650	58,530	60,629

Excepting for the year 1894 the increase of production has been continuous during the period of seven years, and last year's output was larger than in 1892 by 16,000 tons, or an

increase of nearly 37 per cent. The increase in value of production from the first year of the period to the last has been \$116,186, or 71 per cent., and the increase in the amount

of wages paid for labor has been \$22,829, or 69 per cent. The number of men employed in the industry last year was 191, and their average rate of wages \$318.

The total quantity of salt produced in Ontario during the seven years was 336,948 tons, valued at \$1,349,878, and in the seven years ending June 30, 1898, there was imported for consumption in Canada 750,090 tons, valued at \$2,522,973. The great bulk of the salt imported (about 95 per cent. of the whole) comes in free of duty, and there is enough salt rock underlying one square mile of western Ontario to supply the whole of Canada at the present rate of consumption for 2,400 years.

The total quantity of gypsum mined last year was about 3,000 tons. The mines were worked only part time, and gave employment to an average of 15 men; wages, \$2,000. The value of products, including plaster, alabastine, etc., was \$14,600.

Schedule.		
Statistics of three years.	Ore smelted	tons
	Scale and mill cinder	"
	Limestone for flux	"
	Coke for fuel	"
	Pig iron product	"
	Value of product	\$
	Wages for labor	"
	Average workmen	No.

The proportion of Ontario ores used in the furnace last year was 27 per cent. of the whole, being 20,968 tons, whereas in 1897 it was only eight per cent. Two mining companies, whose operations were carried on chiefly in Hastings county, raised during the year 27,400 tons, nearly all of which was shipped to Hamilton. Its selling price at the mines is given in the returns as \$48.875, or \$1.78 per ton. At the furnace the value of Ontario ores smelted was \$62,904.81, or \$3.00 per ton, which is the same rate as for American ores. The value of mill cinder at the furnace was \$17,222.22, of limestone for flux \$11,039.44 and of coke for fuel \$158,783.22. The total value of raw materials and labor at the furnace was \$479,597.64, and the total value of pig iron product \$530,789. At the iron mines an average

Graphite and Mica.

The graphite mine in Brougham township was worked during only six months of last year. In that time 300 tons of ore were raised, valued at \$6,000. Ten workmen were employed.

Mica has been discovered at a number of points during the last few years, chiefly in Muskoka and Frontenac. At most of the properties however operations have not got beyond the development stage, and the returns show that only one of them was a producer last year. The Stoness-Kent mica mine, which is on lot 4 in the thirteenth concession of Bedford township, produced 34 tons of mica, valued at \$7,500. From 12 to 18 men were employed. Only small lots were taken out at other locations. Mica for boiler covering is growing actively in demand.

Pig Iron and Iron Ore.

The following table gives the statistics of the Hamilton blast furnace for the three years it has been in operation :

1896	1897.	1898.
51,138	37,492	77,023
5,883	5,350	8,614
8,657	9,473	13,799
30,348	27,810	50,407
28,302	24,011	48,253
353,780	288,128	530,789
47,000	40,000	61,476
125	130	130

of 100 men were employed whose wage earnings were \$26,700, and the value of ore mined, computed at the selling price at the mines, was \$48,875.

Copper and Nickel.

There has been a stir in the copper and nickel mines during the past year, and a number of new properties have been developed. Besides the mines in the Sudbury district, several locations north of lake Huron, in the vicinity of Bruce Mines, have been receiving the attention of prospectors and capitalists. The Joseph Powers Syndicate on the Mississauga river has sunk one or two shafts, the old mines at Bruce Mines have been unwatered with a view to the resuming of operations there, and a new company has been opening

Extension of Mining and Prospecting Operations.

up large showings of ore at Rock lake, in Coffin township (now called Aberdeen). This last venture has been acquired by a syndicate now organized as the Rock Lake Mining Company, with an authorized capital of \$1,000,000. The locations are situated about 10 miles north of Bruce Mines station, and comprise an area of 1,400 acres. The vein has been traced on the property for a length of three miles, and samples of float ore may be picked up to the south of it a long distance. Work was commenced in April of last year upon an outcropping of ore about 300 feet above the level of Rock lake, and two adits 1,200 feet apart have been driven in from opposite sides of the ridge which holds the vein that prove its thickness to be 16 to 17 feet. A shaft is in course of being sunk, and test pits have been dug at various points which indicate that the vein is well mineralized throughout its whole length. Work has also been resumed on

Michipicoton island, where native copper occurs in amygdaloid trap and conglomerate, but although good samples are shown and rich outcroppings have been discovered enough work has not yet been done for a judgment to be formed of their extent and value. In the township of Garson, about ten miles north of Sudbury, a copper-nickel deposit was opened last year, and a furnace to smelt the ore was in course of construction. North of Markstay station also active development work has been carried on and extensive bodies have been exposed, some of which carry gold as well as copper and nickel. The Canadian Copper Company, however, is the principal operator, and several new mines have been developed by this company.

The following table shows for the seven years 1892-98 the quantities of ore raised and smelted in the Sudbury district, and the per cent. of metallic contents in the ore smelted each year :

Year.	Ore raised, tons.	Ore smelted, tons.	Per cent. of metallic contents in ore smelted.		
			Nickel.	Copper.	Cobalt.
1892	72,349	61,924	3.36	3.19	.1007
1893	61,043	63,944	2.21	2.38	.0800
1894	112,037	87,916	2.92	3.14	.0721
1895	75,439	86,546	2.67	2.73	.....
1896	109,097	73,505	2.67	.....	.....
1897	93,155	96,093	2.08	.....	.....
1898	123,910	121,924	2.28	.....	.....

The total quantity of ore raised in the seven years was 650,040 tons, and the quantity smelted 591,852 tons. Last year's output alike of the mines and smelters was considerably more than in any previous year. It will be noticed that the increase in ore smelted has been almost steadily continuous from year to year, and while last year's record was more than 25 per cent. in excess

of the previous year it was nearly 100 cent. more than in 1892. The percentage of nickel contents is fairly well maintained, but the percentage of copper was higher last year than in any one of the seven years.

The labor statistics of the mines and works are shown for the same period of seven years in the next table :

Year.	Workers of 15 to 17 years		Workers over 17 years		Total workers.	Total wages.	Average wages.
	above ground.	under ground.	above ground.	under ground.			
1892	10	.....	483	197	690	\$ 339,821	\$ 492.50
1893	10	.....	356	129	495	252,516	510.13
1894	17	.....	395	243	655	311,719	475.90
1895	7	.....	341	96	444	209,960	472.88
1896	8	.....	297	180	485	247,151	509.59
1897	12	.....	379	144	535	253,226	473.32
1898	24	.....	418	195	637	315,501	495.29

The total number of workmen employed last year was larger than in any previous year excepting 1892 and 1894, and the amount of wages paid for labor was larger than in any year excepting the first. The aggregate amount of wages paid for labor in the seven years was \$1,929,894, or an average of \$489.45 per year; for last year the average was \$493.74, which is higher than for any of the other years excepting 1893 and 1896.

Comparative statistics of the industry are given in the following table for the seven years, showing for each year the quantities of ore raised and smelted, the product of matte from the ore smelted, the estimated metallic contents of the matte and the value of the metals, together with the number of men employed at the mines and works and the amount of wages paid for labor :

Schedule.	1892	1893.	1894.	1895	1896.	1897.	1898.
Ore raised tons	72,349	64,043	112,037	75,439	109,097	93,155	123,920
Ore smelted "	61,924	63,944	87,916	86,546	73,605	96,094	121,924
Ordinary matte "	6,278	7,176	10,410	12,525	9,733	13,706	21,101
Bessemerized matte .. "	1,880	452	1,470	103½		328	.....
Nickel contents..... "	2,082	1,653	2,570½	2,315½	1,943½	1,999	2,283½
Copper contents..... "	1,936	1,431	2,748	2,365½	1,868	2,750	4,186½
Cobalt contents..... "	8½	19	3½				
Value of nickel ... \$	590,902	454,702	612,724	404,861	337,000	359,651	514,220
Value of copper.... "	232,135	115,200	195,750	160,913	130,663	200,067	268,080
Value of cobalt..... "	3,713	9,400	1,500				
Wages paid..... "	339,821	252,516	311,719	209,965	247,151	253,226	315,501
Men employed.... No.	690	495	655	444	485	535	637

In the seven years the quantity of ore smelted was 591,852 tons, which on being reduced to matte gave 80,929 tons ordinary and 4,233½ bessemerized matte, or in the proportion of 100 to 14.38. The estimated metallic contents of matte product in the seven years are 14,852½ tons or 29,705,000 lb. nickel, 17,285½ tons or 34,570,500 lb. copper, and 30½ tons or 61,500 lb. cobalt. At the selling price of matte at the furnaces, which is the form in which it is exported to the

refineries, the total value of nickel product for the seven years has been \$3,294,060, of copper \$1,302,805, and of cobalt \$14,613, or a total of \$4,611,478. The selling value of last year's product was \$782,300, the estimated quantities being 4,567,500 lb. nickel and 8,373,500 lb. copper.

Comparative values of the metallic contents of the matte based on the selling price at the works are given for the seven years in the next table :

Year.	Nickel		Copper		Cobalt	
	per ton.	per lb.	per ton.	per lb.	per ton.	per lb.
	£	cents.	£	cents.	£	cents.
1892.....	283.81	14.190	119.90	5.995	436.82	21.841
1893.....	275.08	13.754	80.50	4.025	494.73	24.736
1894.....	238.36	11.918	71.23	3.561	461.54	23.077
1895.....	174.83	8.741	68.02	3.401	.....	.....
1896.....	183.22	9.166	69.94	3.497	.....	.....
1897.....	179.91	8.995	72.75	3.637	.....	.....
1898.....	184.72	9.236	64.02	3.201	.....	.....

These figures show a slight rise in the value of nickel compared with the averages of the previous three years, but a large decrease compared with the first three years of the period. In the case of copper the

lowest point of the period was reached last year, although the price of copper had gone up to a point not reached during many years. Obviously the value should be considerably higher than it appears.

Gold and Silver.

Gold was produced last year at 17 locations, but as only four of these have reported an output in excess of \$20,000 it will be readily understood that a large majority of them are yet only in the early prospecting stage. The leading ones are the Sultana, the Mikado, the Regina and the Belmont. The Regina however was closed down for five months, during reconstruction of the mill. The Foley was also idle for the greater part of the year, pending a sale of the

Statistics of seven years.

property in England. In the eastern part of the Province the Belmont and Deloro mines promised well at the beginning of the year, but unfortunately the mill of the Deloro was destroyed by fire early in spring, and a new one erected in its stead was not completed until the close of the year. Both of these mines give assurance of good results for the present year, and in the west the outlook is very hopeful. The following table gives the statistics of gold mines and mills in the Province for the seven years 1892-98 :

Schedule.	1892.	1893.	1894.	1895.	1896.	1897.	1898.
Mines worked number	9	15	4	8	8	9	17
Men above ground .. "	85	112	40	126	103	222	296
Men under ground.. "	40	56	52	111	86	216	284
Ore treated tons	3,710	5,560	2,428	6,500	13,292	27,589	57,895
Gold product. oz.	1,695	2,022½	3,038	7,154	11,412	16,261	16,261
Gold value..... \$	36,900	32,960	32,776	50,781	121,848	190,244	275,078
Wages paid for labor "	22,750	49,027	38,032	56,234	91,210	217,766	290,919

The total quantity of ore milled during the seven years has been 116,974 tons, and the value of gold product was \$740,587, being an average of \$6.33 per ton.

This is proof of the low grade character of the ore, but as nearly all of it is free milling, it is high enough to earn a good margin of profit when development is sufficiently advanced to provide an ample quantity to keep the mills running steadily. It will then be possible to select the ore, instead of treating all that comes from the mines. Therefore an increase of average may reasonably enough be looked for, unless, as seems likely, some extensive low grade deposits are worked on a large scale. Two of these are the Hammond Reef and the Alice A., where enormous bodies are known to occur, and on which mills of large capacity are likely to be erected soon.

At present the Hammond Reef mill is only equipped with ten stamps, and thirty more will be added this year. As an indication of what may be attained when the enlarged mill is in operation, the following figures are given of the last run made before the mill was closed down in December :

Hammond Reef Mine's record.

Ore treated..... tons	396
Time of milling hours	437½
Wood burned at mill..... cords	84½
Wood burned at pump "	18
Concentrates produced..... lb	6,400
Bullion produced..... oz	89.9
Mint value less express charges and charges of treatment	\$1,510.00
Wages and supplies	837.26

The time was about 18½ days of 24 hours, and although the value of the ore was only \$3.81 per ton the net profit after deducting wages and supplies was \$672.74, being \$1.70 per ton or \$36.86 per day. At the same averages a mill of forty stamps working 300 days in the year should produce \$99,288 of gold and earn a profit of \$44,232. But with the larger mill the cost of production might be very considerably reduced, while a higher average of bullion per ton might be obtained by proper selection of the ore raised from the mine. In this estimate however no allowance has been made for interest of capital invested, or for the wear and tear of machinery.

Statistics having another kind of value have been placed at the disposal of the Bureau by the managers of the Mikado mine. They show the number of days of mill runs, the total quantity

Record of the Mikado Mine.

of ore milled from the commencement of operations in 1896 down to the end of March of the present year, the product of gold in ounces and its mint value. The first item in the table which follows is a total of three runs made at a customs mill in September and December, 1896, and the others are records from the Company's own mill commencing in August, 1897.

Days run.	Tons of 2,000 lb.	Gold, oz.	Value, \$.
1896—			
1897—	297	969	13,395.23
16	800	946	14,524.37
10	550	498	7,708.68
..	580	320	4,991.56
18	728	350	5,429.11
18	850	389	5,727.53
1898—			
20	800	463	6,868.44
14	570	462	6,706.50
28	1,200	550	8,342.51
27	1,250	730	10,955.47
24	840	444	6,248.54
17	600	169	2,218.15
20	730	240	3,109.74
21	640	251	3,569.20
21	770	265	3,494.76
17	809	134	1,900.76
21	1,050	227	3,399.13
23	1,150	250	3,563.04
26	1,150	393	5,829.52
23	1,100	407	6,034.09
22	1,000	316	4,717.15
24	1,000	236	3,727.35

The total quantity of ore milled was 18,464 short tons, the weight of gold saved by amalgamation 9,009 ounces, and the value of bullion by mint returns \$132,460.83. A cyanide plant for treating tailings was completed early in November of last year, and from that time until the end of March last the quantity treated was 2,099 short tons, which yielded 566 ounces of bullion, with a mint value of \$5,072.37. Adding this product to the product obtained by amalgamation the total is 9,575 ounces, worth at the mint \$137,533.20, being an average of \$7.44 per short ton or \$8.34 per long ton of bullion won from all the ore treated.

Two of the working mines in the county of Hastings are deserving of mention here for the skill and energy with which operations have been carried on.

The Deloro mine, five miles east of the

village of Marmora, is one of the oldest gold mines in the Province. The record of the numerous attempts which have been made to treat its refractory arsenical ores is an interesting chapter in the history of metallurgy. After lying idle for a number of years the property was purchased about two years ago by a company known as the Canadian Goldfields, Limited. Since then development work has been carried on vigorously at the mine. The shaft on the main lead is nearly 300 feet deep, and three other veins have been opened up by cross-cutting. The new mill is built upon a knoll 500 feet southwest from the shaft, and is thoroughly modern and efficient in its design. The ore is crushed in a ten-stamp battery, and passes over five-stepped plates to two Frue vanners. The tailings from these are sized hydraulically and pass to another set of vanners where a second concentration is effected, after which the tailings are discarded. The concentrates are wheeled to the leaching house and treated in vats by the bromocyanide process under the patents of Messrs. Sulman and Teed. When the extraction is complete the residues are withdrawn and stored in order that the arsenic may be extracted at some future time. A well-equipped laboratory adjoins the mill, and careful control over all the operations is maintained. A building close to the mill contains a 20-drill Rand compressor, which supplies power underground for the drills and pumps.

Ten miles northwest from Marmora lies the Belmont mine, at present the property of the Cordova Exploration Co., Limited. During the last two years great changes have been made here, and the mine can rank with the best in Ontario. At the time of the purchase in 1897 a small shaft represented the development work, and now three shaft houses with their dumps of waste rock give an indication of the activity below. A ten-stamp mill crushes the ore, which is concentrated on Frue vanners, the tailings being treated again on a large gyrating vanner. Every part is of the latest design and appears to work most efficiently. A 20-drill Rand compressor is being installed at a point convenient to the several shafts, and this promises a vigorous

attack upon the ore deposits in the several veins which traverse the location.

The output of these two mines for the first half of 1899 is an indication that they will compare very favorably in amount of production with the mines of the western part of the Province. They are both under excellent management.

During 1898 work was resumed on three of the old silver mines in the townships of Gillies and Lybster, southwest of Port Arthur, which had been closed down since 1893. The following table gives the statistics of the mines for last year :

Silver Statistics.

Ore raised.....	net tons	6,600
Ore stamped	"	5,600
Bullion product.....	oz.	86,600
Value of bullion.....	\$	51,960
Wages paid for labor,....	"	28,430
Average workmen above ground..		32
Average workmen underground ..		27

The value of silver is computed at the average of New York quotations for the last six months of 1898.

Mining Accidents.

Thirteen accidents, involving 15 men, were reported to the Bureau of Mines as having occurred in 1898, five men having been killed and ten more or less severely injured. The number of fatalities is in excess of the average ; but at

Nature of Accidents during the year.

least two of the five, though occurring at mining works, were not of a kind peculiar to mining operations, being rather such as might happen in connection with industries of almost any sort. The five deaths were caused by (1) being caught in the revolving shaft of a stamp mill, (2) falling down an unused mine shaft, (3) being run over by a railway train, (4) falling down a shaft while riding in an ore bucket, and (5) falling down the face of a stope a distance of 22 feet. The other accidents were mainly of the usual type, resulting from premature or unexpected explosions, falls of rock, etc., the injuries in some cases being severe, and in others comparatively trifling. Following are particulars of the several casualties :

At Location HW16.

A peculiar mishap occurred on mining location HW16 north of Big Sandy lake

and east of lake Minnetakie, Rainy River district, on 2nd April, by which Peter

Smith had his left hand and the thumb of his right so badly hurt that they had to be amputated,

and two other men named James Aitkins and T. Andrews were less seriously hurt.

These men were working under the direction of Mr. S. H. Williamson, who had the contract of sinking upon the property. They

were employed in one of the shafts, and having broken a drill in a hole they charged

the latter with dynamite for the purpose of throwing out the broken steel. This they

succeeded in doing without blasting the rock. They then resumed drilling in the same hole,

when after working upwards of twenty minutes and dulling one drill an explosion

occurred, the force of which took effect upon Smith, who was holding the drill while the

others were striking, with the result above stated. Andrews was bruised about the face

and breast and Aitkins slightly cut near one eye. Smith was brought down to Dinorwick

where his hand and thumb were amputated by Dr. F. A. White of Wabigoon. He was

afterwards sent to the hospital at Port Arthur for care and treatment.

At the Foley Mine.

At the Foley gold mine on 21st January James Shortreed received severe injuries,

which ended in his death on the 29th of the same month. The circumstances were

as follows : Shortreed, whose duties were to attend the ma-

chinery of the stamp mill, was a member of the night crew and shortly after

beginning work on the evening in question noticed that the main driving belt of the

north battery had become disconnected on account of the wearing out of the lacings.

He took it off, relaced it and with a lighted candle in his hand jumped down on the

ground from the battery-room floor with the intention of replacing the belt on the pulley,

the engine and machinery being in full operation. The loose sleeves of his working

blouse caught on the shaft and he was quickly drawn down to and whirled around

it. His working mate, Joseph C. Foley,

Three men injured by an Explosion.

James Shortreed fatally injured.

junior, ran to the engine, shut off steam and summoned help. Shortreed was disentangled and removed to Mr. J. E. Everett's house, the regular hospital being temporarily occupied by teamsters engaged in filling a wood contract. Dr. D. C. Mackenzie was called and arrived in about an hour and a quarter from Mine Centre. Examination showed that Shortreed's injuries were very severe, consisting of a compound comminuted fracture of the left leg, fracture of the right leg above the knee, and also of the right arm above the elbow. In addition he was hurt internally by the severe compression he had sustained upon the shaft. His wounds, though so serious, were not considered necessarily fatal, but they proved sufficient to end his life in a little over a week's time. There is little room to doubt that Shortreed's own carelessness brought about his death. It is by no means an uncommon thing in factory or mill to throw a driving belt upon a pulley in motion, but there is always danger connected with the practice, and the loose sleeves of the unfortunate workman's jacket were just what was needed to bring about an accident of this particular class, which is always severe and frequently fatal.

At the Mikado Mine.

At the Mikado gold mine on 12th March a miner named John Dunphy, who is described as an old and experienced workman, found himself in darkness after a blast at the 120-foot level. Though warned, as is stated, to carry matches for use in such a contingency, he does not appear to have had any at the time, and began walking about, with the result that he fell down No. 1 shaft a distance of about 45 feet. Fortunately beyond a thorough shaking up he sustained no serious injury, and was able to do surface work again about May 1st. A few weeks later he resumed his duties in the mine.

At the same mine on 16th July a miner named Joseph Newton while "mucking" in

No. 1 shaft of the same mine was injured in the following way: In hoisting after a blast in the shaft, which was 227 feet deep, the bucket caught in the bell wire; the latter being drawn

up became entangled around some timbers about 140 feet from the top and wrenched one of them from its fastenings. It dropped down the shaft and touching the bottom rebounded and struck Newton on the forehead. The shaft had been fitted with permanent timbering for about 140 feet down, and below that point temporary lagging had been put in for the construction of a ladderway. The piece which fell had not been "hitched" into the walls of the shaft, but was merely spiked. Newton suffered a slight concussion of the brain, but a few days' treatment in the hospital at Rat Portage restored him to health.

At West Silver Mountain Mine.

Notification was received from Mr. H. Shear, manager of the West End Mine Syndicate, of the death by drowning of one William Montgomery at that mine on Silver Mountain on 13th May. Inspector Bow was directed by telegraph to make an investigation into the circumstances, which he did, and reported as follows under date of 21st May:

PORT ARTHUR, May 21, 1898.

SIR,—According to your instructions I visited the West End mine at Silver Mountain, and inquired into the circumstances attending the death of W. N. Montgomery, which occurred on the 13th inst. Evidence upon oath was not taken, as such was not specified in your directions. The details of the accident were described to me respectively by H. Shear, superintendent of the mine, Colon Tonkin, mine captain, Mrs. Montgomery, wife of deceased, and John Hayes, engineer (all of whom were present at the time of the accident), and I beg to submit herewith the following report:

The deceased was a man of sixty-one years of age. He was a miner by business, and had been at Silver Mountain for fourteen years. He had been caretaker at the West End mine for eight months, preceding the recent opening of same. Formerly he was employed at the Crown Point mine. At the time of the accident he was not an employé of the present operators, but his wife had a contract to board the employés, and still fill's that position.

The scene of the accident was a tunnel which had been driven north into the hillside. I visited the same and made the following notes: The tunnel is four by seven feet in size and 96 feet long. At the end a winze about six by six feet in size had been sunk 22 feet. There is 14 feet of

water in the latter. Forty-eight feet from the entrance some cross pieces, provided with meat hooks, were placed near the roof. The hooks were at the east side. On the west side at the same point a small table is provided, which stood in a recess in the wall. The winze is 31 feet from the last meat hook. It was not fenced, but the entrance to the tunnel was secured by a door. The tunnel has been abandoned for some years, and was lately employed for storing meat.

The facts regarding the accident were as follows: On the 13th inst., at a little past 7 p.m., deceased was carrying a quarter of fresh beef up to the tunnel. Finding it heavy, he laid it down a few hundred feet from the latter place, and cut it in two. He carried one half up the tunnel, leaving a small boy to guard the remainder. The boy waited for about three-quarters of an hour, and thinking something was wrong as deceased did not return, he went down to the boarding house and informed Mrs. Montgomery, wife of deceased. Mrs. Montgomery went up to the tunnel and entering a few feet called, but received no answer. She sent a little girl, whom she had with her, for a lantern. Mr. Hayes, the engineer, returned with a lantern and went in as far as the winze with Mrs. Montgomery. A hat was seen floating on the water in the winze, and it was identified as belonging to the deceased. A grappling hook was made and Capt. Tonkin and Mr. Hayes recovered from the bottom of the winze the body of the deceased, and the beef he had carried in. His watch was stopped at 7.14 p.m. It was about 8.15 p.m. that the hat was found, and the body was recovered shortly after. There was a slight bruise on the forehead, which was doubtless caused by his striking against the side of the winze in the fall.

Nobody can account for the affair. It was known that he went in without his candle, as the latter was found near the entrance of the tunnel. It appears that in the darkness he went past the meat hooks and the table without seeing them, but it is not likely that he was observing very closely where he was going, as in passing a person should see the cross-pieces over head, even at that time of day, and the space for passing is also cramped at that point. Deceased must have known of the winze, and its position, as he had taken Mr. Shear in on a previous occasion. He was known to have been a confirmed drinker, but there was no direct evidence to show that he was under the influence of liquor when he went into the tunnel.

The body was buried at Port Arthur on the 16th inst. Mrs. Montgomery has returned to her duties at the mine.

At Copper Cliff Mine.

One Ernest Lamarshe while at work on a roast heap at Copper Cliff mine June 27,

using a pick, shovel and wheelbarrow, was caught and injured by some ore falling from the heap. His left leg was broken, and his body bruised, and he sustained a wound on the scalp.

He was removed to the hospital at Sudbury and on 11th of July was reported as progressing favorably.

Alexander McKinnon, foreman for Mr. D. L. McKinnon, roast yard contractor at the Copper Cliff works, was on 16th August struck by a "jimmy" ore car, weighing about five tons, on the trestle track of No. 2 smelter. He was knocked down and one wheel passed over his back, breaking two ribs on the left side and injuring one of the muscles of his right arm. McKinnon was dumping ore from cars into bins on the trestle track, pushing the cars out of his way as he emptied them. He was in the act of unloading a car when a locomotive which was standing on its crank centres on the same track, having finished taking on water, backed up a little to free its centres preparatory to moving away. In so doing it struck the empty "jimmy" cars and caused them to collide with the one upon which McKinnon was working. The unexpected shock threw him down and brought about the injuries stated above. On 6th September he was reported as being well on the way to recovery.

At the Canadian Copper Company's McArthur No. 1 mine on 27th September one of the Company's miners, Thomas Deacon, received some painful injuries by reason of his failure to get away from an impending blast in good time. He was wounded severely about the shoulders, arms, thigh and leg, but no bones were broken. He was taken to the Sudbury hospital and on 6th October was reported as convalescent.

On 26th September a fatal accident, which was rather a railway than a mining one, befell a man named Harris employed by the Canadian Pacific Railway, engaged on the train running into and out of the Canadian Copper Company's works at Copper Cliff. Harris slipped from a car at the rear end of the train and fell

Ernest
Lamarshe.

Alexander
McKinnon.

Thomas
Deacon.

Harris, a
trainman,
fatally hurt.

beneath the wheels, which cut off both his leg, one at the thigh and the other at the knee. The shock resulted in his death shortly afterwards. No inquest was held. While a brakeman on the Canadian Copper Company's train, Harris was employed and paid by the Railway Company.

The eleventh level of the Copper Cliff mine was on 17th December the scene of a casualty

which resulted in the death of a miner named Jakop Haro or Harri, employed as helper on the machine drill.

Jakop Haro, miner, fatally hurt.

This man was working on a stope and had just climbed up the ladder from the floor of the level with a couple of drill steels. No one saw the occurrence, but it is believed that Haro missed his footing on reaching the platform or on climbing up the stope, and probably disengaged some loose rock which precipitated him to the floor. At any rate he was found lying at the foot of the ladder very severely hurt, his right arm practically severed between the wrist and the elbow, and with multiple fractures of the left arm and a compound fracture of the right thigh. In addition the unfortunate man sustained extensive scalp wounds, though there was no actual fracture of the scalp. The accident happened late in the afternoon, and after his wounds had been dressed at the mine by Dr. R. B. Struthers, Haro was conveyed to the hospital at Sudbury, where he died the following morning between three and four o'clock. On 22nd December an inquest was held by Coroner A. McMurchy, M.D. of North Bay. The foreman in charge of the work deposed that he considered deceased had acted improperly in going up the stope with two steels unassisted. A rope was fastened in the wall at the top of the stope, the lower end being loose, for the purpose of assisting the men in climbing up or down the loose rock forming the face of the stope. Evidence was taken as to the condition of the mine and especially of the eleventh level, the measures adopted for protecting the miners from falls of rock, etc., whereupon the jury found that Jakop Haro came to his death by accidentally falling from the stope to the bottom of the eleventh level of the Copper Cliff mine, a distance of 22 feet, and that no

blame could attach to the Canadian Copper Company, as all necessary precautions appear to have been taken.

At the Sawbill Mine.

On 3rd September an engineer named Gordon, employed at the Sawbill gold mine, was holding a drill while a hole was being bored for an anchor bolt for the bed of the hauling engine, when he passed his arm over the drill and received a flesh wound about three inches up from the wrist. He was sent to Port Arthur for treatment and was able to return to work on the 19th of the month, no permanent injury having been inflicted.

At Golden Star Mine.

The Golden Star mine on 28th October was the scene of a fatal accident which befel a miner named James Teppet in

Fatal accident to James Teppet, miner.

consequence of his recklessness and disregard of rules. At midnight he with two other miners undertook to ascend from the bottom of the shaft to the surface by means of the ore bucket instead of by the ladderway. The engineer was not aware that anything but ore was coming up, as it was strictly forbidden the men to use this method of ascent. Teppet was standing on the rim of the bucket which stopped on its way up, and wishing to give the signal to proceed he released his hold, lost his footing and falling to the bottom met an instantaneous death. Inspector Bow was directed to make an investigation of the circumstances and to take evidence upon oath, and a copy of his report is appended. It affords another proof of the adage that "familiarity breeds contempt." In some occupations the constant presence of danger seems to lead to a foolhardiness and disregard of all precaution, which men in less dangerous callings rarely show.

RAT PORTAGE, February 1, 1899.

I beg to report herewith the results of the inquiry into the death of James Teppet, which occurred at the Golden Star mine on October 28 last.

I examined under oath John McHugh, Gordon Clarke and R. A. Kerr, the superintendent. Thomas A. Thomas, who rode up in the bucket with McHugh and deceased at the time of the

accident, having left the employ of the company, I was not able to obtain his statement; but the evidence secured was sufficiently clear without further investigation. A summary of the evidence obtained is as follows:

John McHugh: I was employed as a miner, working a night shift at the time of the accident. Tom A. Thomas, Albert Johnson, deceased and myself were hand-drilling at the bottom of the shaft, which was about 40 feet below the fourth level; the latter is 300 feet down. About ten minutes to twelve (midnight) we stopped work as usual to ascend to the surface for lunch. Johnson went up the ladderway, which was in a good condition; thirty feet of rope ladder extended from the bottom to a wall-plate, on the foot wall, from which it was hung, and a wooden ladder reached from there to the fourth level. The remaining three of us started up in the bucket, Thomas inside, and deceased and myself standing on the rim, holding the rope. One bell was rung, the signal to hoist. We ascended until about 40 feet above the second level, when the bucket stopped; no signal had been given and we did not know why it stopped. Deceased then let go the rope, turned around and leaning against the division between the hoisting compartment and manway looked through an aperture in same. He regained his former position on the bucket, and then turned again towards the manway, letting go the rope. While he was in that position the bucket started, after having stopped for what appeared to me a couple of minutes. I don't know whether the bell rope had been pulled or not; the bucket started unexpectedly, not giving deceased a chance to regain himself, and before anything could be done his feet were raised above his head and he fell down the bucket-way. I rang the bell for the bucket to descend to the second level, where Thomas and I got off and went down the ladderway to the third level. There we found deceased hanging on the trap door, quite dead. He had fallen a distance of about 115 feet. We knew it was against orders to ride in the bucket, but it was commonly done in ascending from the third and fourth levels. A notice had been posted up forbidding same. I had come up in the bucket before a couple of times. There was no reason why we should not have used the ladderway on that occasion instead of the bucket.

Gordon Clarke: I was employed in running the hoister at the time of the accident. About ten minutes to twelve I got a signal (1 bell) to hoist, the bucket being at the bottom of the shaft. I brought the bucket up to what I considered would be the second level and stopped. As no work was going on in the first or second levels the bucket was never required to stop there as a rule, and hence there was no mark on the rope to indi-

cate when it was at those stations. The bucket stopped about a minute when I got one bell to hoist again. I raised it about 10 feet when one bell was given to stop, and then four bells to lower. I lowered to the second level and stopped. On learning of the accident the night captain went down, had deceased put in the bucket at the third level; and I brought him to the surface. The men had always been forbidden to ride in the bucket, and a notice was posted up to this effect. But nevertheless they used to get in at the lower levels, ride to the first level, jump off without stopping the bucket and go up the ladderway to the surface, so that they could not be caught. I had never before known them to start from the bottom in the bucket, as the lowest skids were always temporary and loose, and hence not safe for riding purposes. Hence I did not suspect that men were on board. There is no signal to indicate that men are in the bucket.

R. A. Kerr, Superintendent of the mine: "I was awakened about fifteen or twenty minutes after twelve, and told that a man was killed at the mine. I dressed and went up as quickly as I could. When I arrived I found he had been raised to the surface. I inquired how he met with the accident, and was told that he fell off the bucket. As the men were all excited I asked no more questions. I saw that the man was quite dead, with a large gash in his head. On a previous occasion I had spoken to the mine captain about men riding in the bucket, and told him to warn them against it. Notices were posted up at the surface regarding the matter. Deceased, who was of a reckless disposition, had been warned particularly by the captain a short time before the accident."

At Location HW 359.

An unusual accident occurred on mining location H W 359 (Lower Manitou lake), the property of Messrs. Barker Bros., on 4th October, by which Nelse Carlson suffered severe bodily injury. Blasting was going on in a shaft about 15 feet deep and the last shot for the day was fired at 5.30 p.m. The miners sought cover as usual, and Carlson deemed himself sufficiently protected about 500 feet from the shaft behind a large tree, on a small eminence overlooking the mine. A piece of rock, however, about 25 pounds in weight struck him five inches below the left thigh joint and broke his leg. It is thought the missile must have glanced from one of the trees on Carlson's left, as it seemed an

impossibility for it to have reached him in a direct line from the shaft. Two men were immediately dispatched in a canoe to Gold Rock to bring Dr. Denmark, who arrived at 7.30 a.m. the following day. The doctor set Carlson's leg and had him removed to Gold Rock, where a vacant log house was rented for his accommodation and a man employed

to take charge of him. Complications, however, set in and it was deemed advisable to remove Carlson to the hospital at Rat Portage, whither he was taken on 3rd December. On 14th December and again two weeks later Carlson was reported as doing as well as could be looked for.

THE CONDITION OF ONTARIO MINES

By Courtenay De Kalb, Inspector

Introduction.

I BEG to submit the following report upon the results of a tour of inspection of the mines of Ontario, made during the summer and autumn of 1898. Visits were made to all the larger mines in actual operation throughout the entire Province, both east and west. Incidentally a number of smaller mines and prospect workings were visited, but no effort was made to inspect all such properties, the limited time at my disposal precluding any attempt to do so.

After having visited the principal mines in Ontario I have been impressed with the very general desire on the part of mine managers to conform not only to the letter but to the spirit of the

The status of Mining in Ontario.

laws and the regulations of the Bureau of Mines, relating to matters affecting the health and safety of the miners. In seeking these *desiderata* the more progressive mine managers perceive that they are also achieving economy, which will make a favorable showing on their annual balance sheet. At a number of the larger and more progressive mines it was not uncommon to find local rules enforced which were far in excess of the legal requirements for safety, and it is evident that more stringent regulations in many matters would be welcomed, at least by a large portion of the mining community, since it would tend to the development of a larger body of skilled miners in the Province, which would inure to the benefit of all concerned. The lack of such a body of well-trained miners is a serious drawback to the mining industry in Ontario, and it so happens that the value of such skill is rather discredited among many local mine owners from the circumstance that inefficient stragglers from the camps of the

West and South have drifted into the Province from time to time, assuming undue importance, and giving altogether a false impression as to the service which a really skilled miner is capable of rendering.

The absence of any requirement as to the qualifications for mine foremen is a serious matter, and the growth of a proper *esprit de corps* among the miners, leading to their own improvement, is not to be anticipated until the mine foremen themselves are required to pass examinations and to show a suitable amount of practical experience, to entitle them to a certificate before assuming direction of underground operations.

The inexperience of the miners is shown perhaps most conspicuously in their misuse of dynamite, and their false setting of shots.

The use of Explosives.

I have rarely seen a hole drilled in any mine in the Province in such a position as to give the highest efficiency to the blast, and by inquiry I find that the consumption of dynamite per ton of ore extracted is excessive. In many cases powerful explosives are being employed where weaker, slower acting explosives would be far more effective in the practical work of winning ore.

There is a very general tendency at the smaller properties to carelessness in regard to the storage, inspection and handling of dynamite, to thawing dynamite, and to the keeping of fulminates separate from blasting materials. The regulations of the Bureau of Mines might advantageously be revised in so far as they relate to explosives.

Although the steam and compressed air drills are very widely used, it is manifest that hand drilling is necessary in prospect work, upon which just now the future of the mining industry in Ontario

Skill in Hand Drilling.

chiefly depends. Whatever will tend to cheapen this kind of effort will lead to wider operations for the development of outcropping veins discovered by prospectors. Hence the training of miners in the proper use of blasting materials, and the setting of holes, and in the work of single-hand drilling, will render it possible to do far more, I think I might say 50 per cent. more, development work than is now done with the same money. I am not aware of more than one mining camp in Ontario where single-hand drilling has been carried on to any extent, and there the interest of the miners has been awakened to such a degree that single-hand drilling matches constitute part of the amusements of the men.

There is still a noticeable tendency on the part of development companies to introduce Machinery v. steam hoists and air compressors, Hand Work. and their accompaniments, before the possibilities of handwork within limits of economy have been exhausted. This is to be deplored, for many a development company uses all its resources on a single vein without learning more than judiciously directed handwork would have revealed at far less cost, and so it ceases to operate, leaving a group of men who might have contributed strength to the mining industry more or less discouraged and disaffected, and consequently unwilling to venture anything again. The work of development is necessarily experimental in large part up to a certain limit, but the work of the mining company after proper exploratory work has been done should be upon a sound basis, with the element of chance virtually eliminated. It is unfortunate that too many companies in Ontario are still inclined to start upon mere development work on a scale which indicates that they expect to continue mining permanently.

The use of kibbles sliding on skidways in inclined shafts is unfortunately very common, the practice apparently being due to false notions of economy. To shallow depths this procedure is not unwise, but in a large number of mines it is persisted in even after it has become the most costly form of hoisting that could be adopted. The

danger of hoisting thus from considerable depths is sufficient to warrant its condemnation.

Fortunately the great majority of the mines of Ontario are in rock so sound that little timbering is required. Where it is used, however, a quite general misunderstanding of the methods of setting it to obtain the full strength of the material seems to prevail, in consequence of which frequent breakages and dislocations of timbers result, with their attendant evil effects upon the progress of mining operations.

In a few of the better conducted mines, on the other hand, the engineering is of an order not excelled in any mining camps in the world.

Iron Mines.

There was considerable activity in the production of iron ores, hematites and magnetites, during the year, occasioned by the demands of the Hamilton blast furnace. The localities where these ores were being mined were confined to the east, along the line of the Kingston and Pembroke Railway, and to the north of Madoc, between that town and El Dorado.

Bedford Mine.

The Bedford iron mine lies near Zanesville P. O., about four miles east from Bedford station on the K. and P. Railway. A branch railroad extends up to the mines, the ore being hoisted at one operation from the mine to the cars in which it is shipped. The property belongs to the Kingston and Pembroke Mining Co., with offices in Kingston, but was being worked on contract by William Edgar of Sharbot Lake. The mine is situated on lot 3, second concession of Bedford, Frontenac county. Fifteen workmen were employed, with John Bragg as foreman in charge. The mine itself consisted of an open pit 27 by 25 feet, and 20 feet deep at the time of my visit on November 2, 1898. Hoisting was being done by a derrick and bucket, but a steam hoist and steam pump were just being installed. The ore is magnetite, and apparently of high grade, so far as iron content is concerned, and the results

of analyses were reported to be excellent. The dip of the deposit was very slight, being towards the s.s.e. The footwall was amphibole rock, and a thin layer of the same existed on the hanging wall side, which soon gave way to a highly metamorphosed limestone. Bunches of amphibole and some calcite occur also disseminated through the body of the ore. The vein is a continuation in a southwesterly direction of that which was once mined on a somewhat large scale at the Zanesville (formerly Glendower) mine. Other promising exposures of ore along the strike of the vein have been made for a distance of nearly half a mile southwest.

Robertsville Mine.

The only one of this group of iron mines at present being worked is that known as the Lizzie mine, situated $2\frac{1}{2}$ miles from Clarendon, on a branch from the King-

Robertsville
Iron Mine.

ston and Pembroke Railway, on lot 3, ninth concession of Palmerston, Frontenac county. It is owned by the Kingston and Pembroke Mining Co., and operated under lease to William Edgar of Sharbot Lake. The superintendent is David Riddle, with Robert Wilson and Robert Richardson as day and night foremen. Twenty-seven men are employed, 11 on the surface and 16 below ground.

The workings were confined to an open pit, which had once been the first level of the old mine, and had considerable underlie. It measured 85 feet by 24 feet, and was down 125 feet on the incline. Twelve feet above the bottom a drift extends west 67 feet, 11 by 7 feet in cross section, which is used for storage of timbers. There are two old drifts higher up, which are now abandoned. The old second level stopes of the mine were filled with water, but preparations were being made to pump them out. By means of a raft I was able to inspect the roof of the old stopes, which in part was unsound. Orders were given to break down the loose portions of the roof before undertaking to mine beneath it. The first level pit is kept unwatered by a Williams steam pump, 4-inch suction and 3-inch discharge. Hoisting is done on a skipway, using a $\frac{3}{4}$ -inch steel cable, wound on a

4-foot drum. The hoisting engine is duplex, with 8 by 18-inch cylinders.

Drilling in the mine was done with two Ingersoll-Sargeant drills, and one "Mac" drill, made by A. R. Williams & Co., all using steam. Attention was called to the danger of ice forming on the wall overhanging the pit, from condensing steam and from seepage, and suitable provision for safety to workmen was ordered to be made.

Six hundred feet east of the mine were located two powder magazines in close proximity to each other, one for the storage of quantities of dynamite up to 500 lb., and one for a single box for daily use, the latter being heated by a stove. It was ordered that the larger magazine be removed to a greater distance, and that thawing by direct radiated heat from the stove be discontinued.

The ore is magnetite, in many respects similar in occurrence to that in the Bedford mine. The dip of the vein is about 35° s.s.w. Other outcrops are abundant in the vicinity, and some mining had been done on the Sheriff pit, a half mile E.N.E. of the Lizzie. My visit to these properties was made on November 4 and 5, 1898.

Cook Mine.

The location of the Cook mine is on lot 15, fifth concession of Madoc, $1\frac{1}{2}$ mile south of El Dorado. The owners are A. W. Coe, of

Cook Iron
Mine.

Madoc, Thomas Barnes, *et al.* The mine was being operated under contract by W. J. Comerford, George Duff and James Fox. At the time of my visit, July 28, the contractors were shipping 30 tons of ore per diem, and were employing 22 men in all capacities. The mine was an open pit, 30 feet deep and 25 feet in diameter. Hoisting was being done by a derrick and horse whim. Three pumps were being operated by power derived from a 45 h.p. boiler, two pumps having 3-inch discharge, and one having 2-inch discharge. Drilling was done by hand, charges being fired partly by fuse and partly by battery. Dynamite was properly stored in a magazine far removed from the mine. This mine has since been abandoned owing to the excessive influx of water. The ore is hematite, with a little magnetite and much calcite.

St. Charles Mine.

This mine is situated $2\frac{1}{2}$ miles north of Madoc, and is owned by A. W. Coe. It is operated under contract by George Philipps and John Dunn. It is a new working, being only a pit 30 feet by 60 feet, and 30 feet deep. Hoisting is done by a derrick. The ore is a gray hematite. Men employed, 5. Date of visit, November, 11, 1898.

St. Charles
Iron Mine.

Welch Mine.

The Welch mine is situated $2\frac{3}{4}$ miles north of the St. Charles, within sight of it. It is also owned by A. W. Coe, and is operated under contract by John Badgely.

Welch Iron
Mine.

The mine is an open pit, with some underlie, 15 feet by 100 feet, and 40 feet deep. The hanging wall was very insecure, and very little protection was afforded by six stulls, which were inadequate to sustain the load that might at any moment be thrown upon them. Instructions were given as to means for cheaply and efficiently sustaining the wall. Hoisting was done by derrick and horse power. Water was also hoisted by barrel in the same manner. Eleven men were employed above and below ground. Drilling was done by hand. Dynamite and black powder were stored in a shop, which was also used as a dressing room, about 150 feet from the mine. Dynamite was thawed by direct heat from a stove. Orders were given to provide a suitable magazine, and to thaw dynamite with a hot water thawer. The ore was a red hematite. Date of visit, November 11, 1898.

Miller Mine.

The Miller mine is on lot 12, sixth concession of Madoc, two miles south of El Dorado. It is owned by Mrs. Jane A. Wallbridge of

Toronto, and is operated under contract by W. J. Comerford. At the time of my visit, November 11, 1898, work was being prosecuted in an open pit 34 feet deep. From the bottom of this pit the old Miller shaft extends 38 feet farther down, with a cross-section of 8 by 10 feet. This shaft was being opened up, and put into condition for operations during the winter. A pump and hoisting plant

Miller Iron
Mine.

were about to be installed. Hoisting up to this time had been done by derrick and horse power. The force employed consisted of 13 miners and two surface men. Drilling was done by hand, and blasting by fuse and electricity, according to location. Dynamite was stored in a room adjacent to the blacksmith shop, about 400 feet from the mine, pending the construction of a magazine. Thawing of dynamite was done in a hot water thawer. The ores were red hematite.

Lead Mines.

The indications for lead are quite promising in the vicinity of Bannockburn, and more or less prospecting for this metal has been done at various times. The veins are well defined, consisting of galena associated with a gangue of calcite. The galena is non-argentiferous, or practically so. Some years ago a Bleiberg lead furnace had been erected in Bannockburn, but I could not learn that any lead had been smelted in it. Only one mine had been opened up at the time of my visit, and this had hardly progressed further than a "prospect," some 20 tons of cobbled ore having been sacked ready for shipment to

Galena with
a gangue of
Calcite

Belgium. The location of this mine is on lot A, sixth concession of Madoc, about three miles north of Bannockburn. The owners are Leopold Meyer of Angels Camp, California, and R. C. Van der Meulen of Aix-la-Chapelle, Belgium. The superintendent was G. R. Major, with William Prudhomme as foreman. Five miners were employed, and five boys were engaged as cobblers, their ages ranging from 12 to 15 years. The workings consisted of one large pit, 9 feet by 24 feet, and 15 feet deep, and several small pits and open cuts. Hoisting was being done by derrick in buckets. It was intended to sink a shaft from the bottom of the large pit, and to install a modern hoisting plant. Blasting was done by electricity. A powder magazine was located 500 feet from the pit. The vein was 30 inches wide, strike s. 40° e., dip as yet undetermined. The ore was galena with calcite, carrying small quantities of copper and iron pyrites. Date of visit, July 28, 1898.

Hollandia
Lead Mine.

Zinc Mines.

In the vicinity of Chelmsford, Algoma, near Sudbury, are indications of zinc, which may prove to be of some importance. These occurrences seem to have some connection with the graphitic slates, associated with which are also found the deposits of anthraxolite, which have been discussed in former reports of the Bureau of Mines.

The location of this property is on lot 7, first concession of Balfour, Algoma, four miles southwest of Chelmsford. It is owned by George Bennett of Toronto, and was being developed on option by J. G. Mills of Chelmsford, and John Dobbie and Leonard J. Lawrence of Niagara Falls, New York. About 300 tons of ore had been extracted, said to show by assay 45 per cent. of zinc, 0.76 oz. of gold, and 9 oz. of silver per ton. The workings consisted of a development shaft, 7 feet 8 inches by 9 feet 10 inches cross-section, and 98 feet deep, sloping 75° to the south. It was timbered by a collar with timbers laid "skin to skin" to a depth of 9 feet 9 inches. Below that the walls were sound enough to stand untimbered. Hoisting was done by kibles on a skidway, with a horse-whim. Objection was made in this case, as in all others, to the use of kibles on skidway in shafts of any considerable depth. Some minor recommendations were also made regarding platforms at the shaft mouth, and idlers for cable in the shaft. Dynamite was suitably stored at a distance from the shaft. A manway was provided with platforms every 40 feet. It was ordered that the manway should be partitioned off from the hoisting compartment. Date of isit, August 12, 1893.

Balfour Zinc Mine.

Copper and Nickel Mines.

Prospecting for nickel and copper ores was active last year in the whole region from the Ottawa river to the Ste. Marie river, and while considerable development work was being carried on over a large area, the fact remains that most of the actual work was confined to the Sudbury region.

Copper Cliff Mine.

There has been no change in the shaft since the inspections of 1897. The shaft starts with an inclination of 43°, which at the third level is turned through an arc of 600 feet radius to an inclination of 77½°, which angle it maintains to the bottom. The distances measured down the incline to the different levels are as follows:

Measurements of the Shaft.	
Surface to	
3rd level	273 feet 0 inches.
5th "	374 0
6th "	430 3
7th "	433 10
8th "	576 10
9 h "	648 10
10th "	718 10
11th "	783 10
Bottom of shaft	810 10

Hoisting is done at present only from the tenth and eleventh levels. All necessary precautions for safety in the shaft have been taken, except that the signal code was not posted below ground. This was ordered to be done. The old shaft on the 43° angle had been carried down to the seventh level. This is still kept open, and the manway is maintained in a suitable condition to serve as an alternative means of exit. The manway in the new shaft is also kept in excellent condition.

The stopes could not be remeasured without making rather elaborate preparations, and consuming much time. The dimensions according to the former Inspector and according to records in the office of the Company are given in parallel columns.

Stopes of the Mine.

Stopes.	From Inspector's book.			From Office records.		
	Length.	Width.	Height.	Length.	Width.	Height.
	feet.	feet.	feet	feet.	feet.	feet.
7th level	78	23	50	200	48	...
8th "	260	59	60	280	39½	...
9th "	123	50	...	215	31	...
10th "	200	25	60	144	27	...
10.h "	71	23	32	75	30	45

In the eleventh level stope the "back" or floor arch for the tenth level floor is intact. A winze from the bottom of this stope extends 40 feet downward, and from each end of the stope are drifts, one on a N.W. course 42 feet long, with cross-section 8 by 8 feet, and one on a S.E. course 100 feet long, with the same cross-section. Diamond drill holes are carried ahead of the workings as the breasts advance.

The tenth level stope has been carried up to the eighth level through the removal of the intermediate "backs" or floor arches. The walls are nearly vertical, there being but a slight over-lie of the hanging wall. This wall has support from a buttress of rock or ore in place near the middle on the hanging wall side 18 feet thick by 30 feet high. No mining was being done on this level, but the accumulated ore from the broken-down floor arches was being removed. The old cross-cut from the shaft to what was formerly the ninth level stope has been closed by a gate.

The eighth level stope has also been carried up by breaking through floor arches to the third level, but does not constitute part of the stope from the third to the second levels. The floor arch on the eighth level is 40 feet thick, the span being 30 feet. Gates were ordered placed in the cross-cuts from the shaft to the eighth and seventh levels. An arch has been left spanning the stope about six feet below the floor line of the seventh level cross-cut, giving a support at this point for the hanging wall. This arch is 40 feet wide, 18 feet thick, and 30 feet long from wall to wall. A second arch exists about 30 feet S.E. of this, and 30 feet lower down. Its dimensions are 40' by 18' by 25'. Scaling of the walls is done at frequent intervals to avoid rock-falls on the workmen below.

The floor arch of the third level stope has been broken through into the lower stope at only one place. There is also a winze from the top of the stope which has been carried up to the surface.

The first level stope has been broken through the surface, so that it now constitutes in part an open pit. At the N.W. end of this pit a drift is being run towards an old prospect shaft 75 feet beyond. This is the

only mining now in progress above the eleventh level.

The mine is kept well drained and clean. Only one day's supply of dynamite is kept underground. This is stored in a locked magazine in the old fifth level cross-cut, completely blocking the passage. It is warmed by a steam pipe from the old shaft. Explosives are lowered on the first skip down after the noon hour, before the miners return from dinner, being received by a man specially appointed for this purpose, who is the only person in the mine at the time. Ventilation is excellent, except in the upper part of the manway, which is heated by the air from the lower part of the old shaft in which steam pumps are set.

No changes have been made in the surface plant since the last inspection.

The roast yards are conducted as in the past. Warning notices of danger are conspicuously posted at all approaches, and signals are given by steam whistles before blasting and after all danger is over. Roasting is done on contract by D. L. McKinnon.

The only changes in the smelting plant consist in the erection of an extension eastward of the old furnace sheds to accommodate two new furnaces, making five in all. A new dust chamber and stack have been erected between the new furnace foundations, and also two new blowers with a 50 h. p. engine have been installed. The only advice given beyond that already mentioned was to submit to the Bureau of Mines plans drawn to scale of any proposed work affecting existing arches in stopes before undertaking their removal. Date of inspection, August 8, 1898.

Evans Mine.

The work done at this mine for the past year has consisted chiefly in the removal of floor arches and pillars down to the third level, thereby opening the stopes out to the surface as far down as that level. Stripping was progressing on the floor of the old third level at the time of my visit, and also on the west wall near the bottom. The lower stopes are full of water, so that nothing is known of their present condition. The shaft pillar has

been stripped on the north side next to the slope from a point 40 feet below the surface to the bottom of the third level slope. Hoisting is done in kipples. At the upper end of the shaft within the remaining portion of the pillar there is a cross-head, working in guides, which serves to guide the kibble up into the shaft house.

A pit was being sunk about 40 feet S.E. from the shaft house, 25 feet in diameter, and 20 feet deep at the date of inspection. This was evidently endangering the shaft pillar, on which rested part of the foundations of the shaft house. Work at this point has been discontinued.

No changes have been made in the surface plant. The trestle from the shaft house to the dump needed repairing, which was done during my visit. It was required that shaft timbering should be carried further down so as to admit of extending the travel of the cross-head nearer to the point of loading the kibble, which was also immediately done. Signal codes were ordered to be posted below ground, and further work affecting floor arches, beyond that then in progress, to be done only after the approval by the Bureau of Mines of plans for so doing. Date of inspection, August 9, 1898.

McArthur Shaft No. 1.

The original shaft has been opened out, forming an open pit 103 feet deep, 70 feet long at the bottom, and eight feet wide. A surface "backing" or arch has been left 30 feet wide and 20 feet deep, to sustain the hanging wall. The dip of the vein averages about 80°. Hoisting is done by derrick and kibble, the cable passing over the rock house below to the winding engine house beyond. Ladders securely fastened to the footwall afford safe and easy passage for miners. One drill was working in the pit, driven by compressed air. Unwatering was done by bailing. A fence was ordered to be placed around the pit. Permanent mining at this point is not contemplated, a better location having been made 1000 feet S. E., where surface stripping has been done preparatory to regular mining. A tramway with three feet gauge and 25 lb. rails has been laid connecting the new location with the McArthur No. 1 rock house.

The cars will be operated by cable from the winding engine house before mentioned. Date of inspection, August 9, 1898.

McArthur Shaft No. 2.

Work at this point is wholly new. The location is about 3,000 feet north of the old Copper Cliff shaft. ^{Preparations for permanent Mining.} Extensive preparations have been made here for permanent mining operations. The gossan has been stripped down to hard vein capping, and work on the new inclined shaft has begun. The shaft will be located within the country rock on the footwall side, the vein being reached by cross-cuts. A rock house, designed similarly to those hitherto employed by the Canadian Copper Co., has been constructed 375 feet S. E. of the location of the shaft mouth, but on a much lower level so that the skipway above ground will incline only five feet in 100 feet to the dumping cradle at the head of a chute near the top of the rock house.

The hoisting works are located at a still lower level beyond the rock house, and the cable will pass over a sheave on the upper framework of the rock house to reach the shaft. The installation of machinery in the hoisting works consists of two boilers, 100 h. p. each, and two winding drums, five feet in diameter, actuated by engines with 12" by 15" cylinders. There is also an air compressor, capable of supplying power for 14 drills.

A standard gauge railroad track has been laid from the roast yards to the rock house, 3,300 feet in length.

In addition to the indicators for showing the positions of the skips during hoisting and lowering, it was advised that a registering apparatus be provided to record the signals transmitted to the engineer, and also to use detaching hooks with the necessary appurtenances to prevent overwinding, and it was recommended that plans of proposed supports for walls in stopes be submitted in advance to the Bureau of Mines as soon as sufficient exploratory work had been done to permit of so doing. Date of inspection, August 8, 1898.

On September 26 a second inspection was made, by which time the new plant was in operation. Surface ore was being drawn to

the rock house, and the shaft was under way. One Blake crusher was in operation, and a second was being installed. A dry house for miners had been fitted up near the shaft, and a suitable magazine for explosives was being built near the base of the hill below the rock house. As an alternative for the detaching hooks it was suggested that an automatic apparatus for shutting off steam from the hoisting engines in hoisting, and putting on brakes to the drum, might be employed.

Stobie Mine.

The shaft has been extended downward on a 60° angle to a fourth level. The depth on the incline from the third to the fourth level is 65 feet; cross-section 7 by 17 feet. A double track for skips extends down to the second level, and the north track has been carried down into the lower level. The shaft lies wholly within country rock on the footwall side of the ore body, 20 feet distant, the several levels being reached by cross-cuts. The cross-cut to the fourth level is on a curve, general direction w. of n., length 23 feet. The fourth level opens out directly as a large stope, 51 feet long, 43 feet wide, and 60 feet high. The stope is worked on two benches, or steps, the upper step being 45 feet above the floor of the level. The stope is being extended on ore toward the west and north. On the west side the ore face is being dressed at a point 20 feet from the cross-cut preparatory to leaving a pillar to support the hanging wall. An upraise, seven feet by eight feet, extends from the centre of the stope to the third level, being provided for ventilation.

The third level also opens out as a stope, 78 feet long, 80 feet wide, and 70 feet high. It is likewise worked on two benches, and has an upraise to the second level for air.

The dimensions of the second level stope remain practically as at the last inspection. The lower benches have been stripped back to win ore, and the upper bench has been worked back about 40 feet in a northerly direction, leaving a clean face which is to be cut around to form a pillar for the hanging wall. Access is had to this upper bench both

from below and from above through an upraise to the surface, approximately 50 feet vertically. This was adjudged insecure and

Instructions. it was required that the upper part of the upraise must either be cribbed and access cut off, or else it must be timbered down to the stoping chamber and ladders provided at a suitable inclination for ease in ascent, having a guard rail on the side exposed to the open stope. Drainage and ventilation in the mine were excellent. No changes had been made in the surface plant. It was further advised that the signal code should be posted at all loading stages below-ground, and that pillars for hanging wall should have a diameter at bottom of not less than 25 feet and at top of not less than 18 feet. It was also advised that in all cases when the span of a floor arch exceeded 20 feet the minimum thickness of arch should be 12 feet, and in no case should a less thickness than six feet be adopted. Plans drawn to scale were required to be submitted to the Bureau of Mines for approval before stripping of "backs" or floor arches between levels 4 and 3, and 3 and 2 might be permitted. Other recommendations were made concerning blasting, indicators for engineer, and disengaging apparatus to prevent overwinding. Date of inspection, August 6, 1898.

The Canadian Copper Co. was overhauling the free library at Copper Cliff, and had nearly completed a large public hall for the miners, located near the McArthur No. 2 shaft, which was to be rented until its cost was recovered, when it was to be turned over to the town of Copper Cliff as a free hall.

Kirkwood Mine.

This is a new mine, located on lot 8, third concession of Garson, District of Nipissing, about six miles n. e. of Sudbury in a straight line, and nine miles by road. The discovery was made by G. W. Jackson and Alex. Mennie, and development work on a somewhat large scale was being undertaken by T. N. Kirkwood of Sudbury, under option. The ore body consisted of pyrrhotite and chalcopyrite, carrying nickel, the appearance of the ore being

A property
in Garson
Township.

Free Hall
and Library.

similar to that found in the other copper-nickel mines of the Sudbury region.

The work in progress consisted of three shafts. Shaft No. 1 was 20 feet deep, 12 by 9 feet in cross-section. It is timbered to a depth of 11 feet by hewn timbers set skin-to-skin. Cross-section inside timbers 8'-9" by 6'-9". Shaft walls below timbers well trimmed and sound. Hoisting was done with an iron-bound kibble and windlass, using 1½-inch hemp rope. Water is removed by bailing. Shaft No. 2 had a depth of 38 feet, cross section 13 by 8 ft. 7 in. Timbered to a depth of 11 feet same as shaft No. 1. Cross-section inside timbers 8 ft. 10 in. by 6 ft. Hoisting arrangements the same as at shaft No. 1. At shaft No. 3 sinking had just begun. Shaft No. 2 is 500 feet E.S.E. from No. 1, and No. 3 is 650 feet S.S.E. from No. 1.

The surfact plant consists of a blacksmith shop 100 feet S.W. from shaft No. 2; a magazine for explosives about 400 feet from both No. 1 and 2 shafts, and 300 feet from No. 3 shaft, well built and guarded against danger from bush fires; a rock house on the north side of shaft No. 2, modelled after those in use by the Canadian Copper Co. The dimensions of the rock house at the base are 28 by 28 feet over all, and 50 high to peak of the roof. The pit-head frame for the shaft was being built adjacent to but detached from the rock house. The construction was massive and strong throughout. In addition there was an office, miners' quarters, and stable, all of logs, about 700 feet distant from all workings. Better windlass supports at shaft No. 2 were required, and it was recommended that the pit-head frame be given a broader base than was contemplated, or else that it be framed into the structure of the rock house to insure greater stability. Date of inspection, August 11, 1898.

Grand Portage Mine.

This mine has for some time been an active producer, shipping its output to New York.

It constitutes mineral Location No.

1, Gould township, district of

Algoma, and is situated by the Grand Portage on the Mississauga

river, 22 miles by road N.N.E. from Thessalon.

Copper property in Gould township.

The owner is J. A. Powers of Lansingburg, New York, and the operators were J. A. Powers, F. A. Cheney, et al., the latter being also the resident manager. The ore body consists of a vein carrying mainly chalcocite, with some bornite and chalcopyrite, associated with a quartz gangue. The cobbled ore shipped to New York is said to contain the proper proportions of FeO and SiO₂ to be self fluxing after roasting.

The mine workings are as follows: A vertical shaft has been sunk 150 feet, cross section seven by nine feet, and six by eight feet inside timbers. Timbering is carried down as a collar to a depth of 18 feet. The walls below this point were sound and well trimmed. A manway was provided in proper form as to length and inclination of ladders, but was not partitioned off from the hoisting compartment. This deficiency was ordered to be made good.

The first level is at a depth of 100 feet, drifting N.W. and S.E. from the shaft; cross-section 6½ by 6½ feet; N.W. drift 100 feet long; S.E. drift 25 feet long.

The second level is at a depth of 150 feet from the shaft mouth. There is only one drift N.W., 75 feet long, cross-section 6½ by 6½ feet.

There is one overhand stope in the 100 foot level, N.W., beginning 43 feet from the shaft; length 44 feet, greatest height 18 feet above the level roof, the width averaging about seven feet. Stulls eight feet long and 18 inches in diameter support "deads" on the first step above the level. These were not properly set, so that breakages of stulls were not uncommon when shooting down the face of the advancing step or slice. Instructions were given as to means for overcoming the difficulty.

One winze had just been started under the middle of the stope downward from the 100 foot level.

The surface plant consisted of the following: A shaft house, 18 by 24 feet on the foundations, and 48 feet high to the sheave pillow blocks. Height over all, 55 feet. A swinging trap-door closes the hoisting compartment before the kibble

Surface plant.

can be dumped. Ore is dumped to a chute leading to a car outside.

The engine and winding drum are in a room adjacent to the shaft house. One 25 h.p. boiler and one 2-drill Rand air compressor are in the same room. The winding drum is 28 inches in diameter, with a $\frac{5}{8}$ -inch steel cable. Adjoining the engine room is a machine shop. The office, quarters and stables are in a row by the river, beginning 400 feet from the shaft house. A trestle runs from the shaft house over the waste dump to a picking floor and store house 100 feet distant.

Pumping is done by two duplex steam pumps. The mine is comparatively dry, and the levels are well drained.

The main magazine for explosives is $1\frac{1}{2}$ mile distant. A small magazine, never containing more than 100 lb. dynamite, is located 500 feet from the shaft house. Explosives are sent below ground only when ready to charge holes for blasting. Blasts are set off by electricity from the surface.

The signal code in use was 1 bell, stop or hoist; 2 bells, lower; 3 bells, caution, run slow. This was required to be modified so that 1 bell should always mean stop. The signal code was also ordered to be posted up at all loading and landing stations. Date of inspection, August 15, 1898.

Bruce Mines.

A portion of this old group of copper mines, located in and adjacent to the town of Bruce Mines, has been drained for examination by Lord Douglas of Hawick. The old shafts thus opened to view were the Scott, Mitchell, Rowe and Grenville, owned by W. H. Plummer of Sault Sainte Marie, Ont. The shafts and stopes present almost without exception perfectly sound walls, and in that respect the mines are safe. Weakening of the walls after exposure to the air would, however, almost certainly occur. The timbers, which had been submerged for years, are in a good state of preservation, but here again rapid deterioration must be looked for. The mine stopes had been opened out to the surface, and stulls set across loaded with waste rock as a covering. These have rotted and are in

an exceedingly dangerous condition. No fences have been erected around the shafts or open stopes, so that there is much danger from this source, which is enhanced by the fact that the region is a rather thickly populated one. This criticism applies not only to the shafts mentioned, but to all of the abandoned workings in this vicinity, which are numerous. Notification was sent to the owners of the properties to observe the mining law in this respect, but no reply has ever been received. The matter is one which merits attention.

The Scott shaft has a depth of 225 feet; cross-section 10 by 16 feet. Three levels open s. e. and n. w. into old stopes of great height. The average width of Scott Shaft stopes is about seven feet, ranging from four to 15 feet. Two parallel lodes have been stoped, connected by cross-cuts, the second or Fire lode, lying about 20 feet s. w. of the main lode. The stopes are nearly vertical, the walls changing position so that no true foot or hanging walls are developed. The s. w. wall, however, for the most part assumes the hanging position. The shaft was sunk on the ore body, and the shaft pillars, if any ever existed, have been removed, except for an arch 20 feet wide and 20 feet deep on the n. w. side at the second level. A Worthington steam pump, 5-inch suction and 4-inch discharge, keeps the mine unwatered. The ladderway is fairly secure.

The Grenville shaft lies 300 feet s. e. of the Scott shaft. The old shaft is completely dismantled, so that access to the workings is obtained by a ladderway leading down directly through the stopes. The open stope is 70 feet long by 14 feet wide. It then extends beyond the shaft n. w. to the Scott stope, and is partly filled with débris. A branch w. n. w. extends under a rock capping 12 feet thick for a distance of 80 feet. From this a shaft has been run s. e. about 200 feet.

The Mitchell shaft is located 300 feet n. w. of the Scott shaft. It has a depth of 190 feet, and on cross-section is 10 by 12 feet, with an inclination 85° toward the s. w. Originally there were four levels. The first level stope has been broken

Old Copper
Workings
unwatered.

Grenville
Shaft.

Mitchell
Shaft.

through to the surface, so that only three levels are now recognized by the workmen. The stopes are continuous to the old third level, floors being on stulls, loaded with "deads." All main stopes extend s. e. from the shaft except for short prolongations in the opposite direction from the first and third levels. A floor arch has been left in place between the old third and fourth levels. The stopes are about 200 feet long by from four to 12 feet in width.

The Rowe shaft is situated 500 feet n. w. of the Scott shaft. Depth, 235 feet; cross section eight by 10 feet. The timberers and ladderway in the old shaft are very unsafe. A new ladderway has been put in at the s. e. end of the stope, following very nearly the location of another old ladderway which is still used, though unsafe. The stopes are 200 feet long, and continuous from the surface downward. The walls are nearly vertical. A Worthington pump in the bottom keeps this portion of the mines unwatered.

Instructions were given regarding the fencing of the workings, removal of dangerous timbering, and better provision for ingress and egress to the mines. Considering the character of the old workings, it was further required that before active mining might begin in them plans of proposed operations should be submitted to the mine inspector or to the Bureau of Mines for approval. Date of inspection, August 17, 1898.

Gold Mines.

The condition of gold mining in Ontario is undoubtedly more promising than in the past. Development of veins is progressing steadily in all parts of the Province, both east and west. There is comparatively little excitement, and the period of "booming" seems to have been superseded by efforts undertaken on a sounder basis. A tendency is still observable here and there to install larger plants than the state of development of the veins would warrant, but the lavish expenditures on wholly undeveloped properties, which characterized a considerable part of the

operations of previous years, are not being repeated to any great extent. In portions of the Province, particularly in the west, development is somewhat retarded on account of the high cost of supplies, and also by the circumstance that large quantities of water have to be raised after sinking a comparatively short distance, which materially increases the cost of exploratory work. A sufficient supply of skilled miners is also wanting, and this again imposes higher burdens of initial expense than should obtain, and undoubtedly serves as a deterrent to the opening up of new deposits.

Deloro Mine.

This mine, which is perhaps the most famous of all the gold mines of Ontario, is again being opened out on an extensive scale, after a period of inactivity. The new work in the mine has been as follows: Gatling shaft has been deepened to 192 feet. Tuttle shaft has been deepened to 122 feet. The Air shaft, 360 feet w. n. w. of Gatling shaft, has been carried down to 63 feet. Keswick shaft, 100 feet north of the old mill, has been sunk to a depth of 50 feet. Gatling level No. 2 south has been lengthened 131 feet, making 410 feet in all. Tuttle level No. 2 south has been driven 90 feet. The south level on the Open Cut vein has been driven 122 feet, and the north level on the same vein 88 feet. The north level on Air vein is 21 feet. Gatling cross-cut west has been lengthened from 90 feet to 250 feet; Gatling cross-cut east from 28 feet to 42 feet, and Tuttle cross-cut (new) is 40 feet. The drift known as "West Cross-cut Level," from Gatling level No. 2 north towards the old Red shaft (new) is 40 feet. The winze on the Gatling vein has been deepened from 18 to 65 feet, and the winze on the Tuttle vein from 10 to 21 feet.

Ore has been won from stopes as follows: From first Tuttle stope north, 350 tons; from first Gatling stope south, 700 tons; from second Gatling stope south, 1,000 tons; from first Gatling stope north, 200 tons; from second Gatling stope north, 300 tons. Total since last inspection up to July 26, 1898, 2,550 tons.

The condition of Gold Mining.

Extent of the Workings.

Shaft pillars are maintained 18 feet wide on each side of the shafts, and a large "horse" remains as a pillar in the first Tuttle stope north. New timbering (stulls) has been set over the level in the second Gatling stope south, with heavy lagging above to sustain ore broken down in future stoping. In the second Gatling stope south the system of rock filling to sustain the hanging wall has been started, and is being well carried out under somewhat difficult conditions. The timbers throughout the mine are in good condition; drainage is excellent, three pumps actuated by compressed air keeping the mine unwatered, and ventilation is unusually good.

One day's supply of explosives only is allowed underground, and this is kept securely locked and removed from all lines of traffic or places where active mining is going on. The operations underground are throughout conducted in a most admirable manner.

The head frame of the Gatling shaft has undergone complete reconstruction, arrangements being made to dump from the skip into bins which deliver ore to cars on a 3-rail incline which goes to the new mill.

The new mill is located 680 feet s. w. of the Gatling shaft, on a slight eminence. The ore is delivered at the top of the mill, and works by gravity through all stages of treatment. Ten stamps have been installed, and the tailings are to be treated by the bromocyanide process in a separate extraction plant, 60 by 38 feet, located 20 feet west of the mill. The boiler and engine house is located 40 feet north of the mill, and two 100 h.p. return tubular boilers had been installed at the date of my last visit. A new assay laboratory, admirably equipped in all details, had also been erected 30 feet west of the boiler house.

A new air compressor plant had been installed by the Canadian Rand Drill Co., the compressors (duplex) being 200 h.p. This plant is in a detached brick building, 50 by 75 feet, located 140 feet s. w. from the mouth of Tuttle shaft.

Improvements have also been made in the magazine for storage of explosives, rendering

it safe. The General Superintendent is P. Kirkegaard. The total number of men employed above and below ground is 63.

A few recommendations affecting security in minor matters were made on my first visit, which had been attended to at the time of my second inspection. Dates of inspection, July 26 and November 11, 1898.

Belmont Mine.

The Belmont mine is located in the s. e. quarter of lot 21, and east half of lot 20 in Belmont township, Peterborough county. The owner is A. W. Carscallen of Marmora, and the operators under option are the Cordova Exploration Co., Limited, of Cordova, Spain. The general manager is D. G. Kerr. Total number of men employed in all capacities, 57.

The underground workings are carried on through three shafts, a fourth shaft being now abandoned. Shaft No. 1, on lot 20, near the road, 10 by 12 feet cross-section, has a depth of 135 feet; inclination 75°. Hoisting is done by skip. Shaft No. 2, 1,021 feet e. by n. of shaft No. 1, is 7 by 12 feet cross-section; has a depth of 75 feet; inclination 75°. Hoisting is done by kibble on a skidway. Shaft No. 3, 1,287 feet s. e. of shaft No. 1, is 8 by 10 feet cross section; depth, 40 feet. It is abandoned, and securely boarded up. Shaft No. 4, 350 feet s. e. from shaft No. 2, is 10 feet by 12 feet cross section; depth 32 feet, vertical. It is a mere prospect shaft. A fifth shaft for air has been sunk 230 feet east from shaft No. 2, 10 by 14 feet cross section; depth, 14 feet.

In shaft No. 1 the 75 foot level is driven east 45 feet, and west 33 feet; the 120 foot level, east 80 feet and west 65 feet.

The cross section is irregular, but averaging about six by seven feet. In shaft No. 2 the 35 foot level is driven east 230 feet and west 50 feet; the 70 foot level is east 75 feet and west 110 feet.

In shaft No. 1 the 75 foot level east is carried up to the surface; the 75 foot level west is 20 feet long and 15 feet high. Stopes in the 120 foot level are just beginning. The walls are sound throughout. In shaft No. 2, 35 foot level east the stope is carried to the surface. The

walls are not sound. Lines of stulls have been set in the stope at two places 15 feet apart vertically, well lagged and loaded with waste rock. All has been done in a workmanlike manner and ample protection insured.

In shaft No. 1 the shaft house is substantially built. The hoisting engine is in full view of the shaft mouth. The sheave is 25 feet above the shaft mouth. There is an automatic dump for the skip, and the cable used in hoisting is three-quarter inch. The tramway from the shaft house to the mill is 264 feet long. Shaft No. 2 has a temporary head frame with a winding engine and boiler in an adjacent shed. Hoisting is by kibble on a skidway. In shaft No. 4 hoisting is by derrick. The old mill is now used as a blacksmith shop and store-room. The location is 57 feet s. e. of shaft No. 1. The new mill is 264 feet s. s. e. of shaft No. 1. The plant consists of a grizzly, Blake crusher, 9 inches by 15 inches, 10 stamps of 850 pounds each, one Frue vanner, six-foot belt, corrugated, one Frue vanner, four-foot belt, plain, and one gyrating vanner, six-foot belt, and three pointed settling boxes in a series for all tailings. Power is derived from a 40 h. p. engine and boiler in adjacent rooms. The tank house for water storage is 495 feet n. of shaft No. 1.

The assay office occupies a brick building 396 feet s. w. of shaft No. 1. The manager's office and quarters is 83 feet w. of the assay office.

Steam drills are employed in both mines No. 1 and 2. This is objectionable on account of the high temperature and dampness of the air, in spite of exhausting steam into sumps. Ventilation and drainage are well provided for. No powder is allowed underground until holes are ready for charging. The storage of explosives is in a well-appointed frame building 495 feet n. of shaft No. 1. Recommendations were made to case off manways, post up signal codes, prohibit workmen from ascending or descending the shafts in skips or kibbles, in addition to other matters of less importance. Dates of inspection, July 27 and November 12, 1898.

Surface
plant.

Diamond Mine.

On July 28 I visited the Diamond mine, on lot 14, in the tenth concession of Madoc. The property is being developed by D. E. K. Stuart of Madoc, under option from William Diamond. An inclined shaft had been sunk 27 feet, at an angle of 75° from the vertical. The cross-section of shaft is six by seven feet. Some trenching had also been done to show the outcrop of the vein.

Hammond Reef Mine.

The Hammond Reef mine is on locations 337 and 338X, east of Sawbill lake and 35 miles south of Bonheur on the C. P. R. The owners are the Hammond Gold Reef Mining Co. of Toronto. The

recent work by this Company consists of an open cut on the adjoining Folger-Hammond location (316X) 60 feet long by 20 feet wide, and varying from 10 to 20 feet deep. Stripping has also been done for about 200 feet across the outcrop, west of the preceding open cut. On location 338X, north of the mill, a new open cut has been started. Also a few hundred tons of ore have been taken out from the old open cut on location 337X. No underground work is in progress. The tramway from the open cut on location 337X has been removed, and a new tramway, one-fourth of a mile long, has been laid from the mill to the new open cut on location 316X. One steam drill is in operation at the Folger-Hammond open cut. The stamp mill remains as at last inspection. The dam above the mill is completed, but the water proving unsuitable it is not used. Water is pumped to the mill from Sawbill lake by a No. 6 Cameron steam pump. It was recommended that the dam above the mill be opened, as in its present condition it would endanger the engine and boiler house at the mill in case of heavy floods. Date of inspection, August 29, 1898.

Sawbill Mine.

This mine was idle at the time of my visit, but a new management was just taking charge of the plant. The new operators are a Toronto syndicate, with Archie Hutchinson, Arthur Harvey and F. McPhillips, all of Toronto.

Work resumed under new Management.

as the executive committee, with J. P. Williams as manager. The only new work done since last inspection was in the main shaft. In the first level the north drift has been lengthened to 182 feet, and in the second level the south drift has been carried to a length of 132 feet.

The stopes are as follows: First level, north, length 91 feet, height above level of the floor 33 feet, width four feet (average). First level south, length

60 feet, height 25 feet, width from four to eight feet. Second level north, length 50 feet, height 14 feet, width three to four feet. Second level south, length 88 feet, height 20 feet, width four feet. At a distance of 66 feet from the shaft in the second level stope north, a raise has been carried up 35 feet. All other underground work is unchanged.

Instructions. Instructions were given to case off the manway in a suitable manner, and to put in platforms in the manway at intervals of 30 feet. Also it was required to post up a signal code at all loading and landing stages, and that further sinking in the shaft without proper skip and skipway must not be done without special permission from the Bureau of Mines. Date of inspection, August 29, 1898.

Roy Mine.

This property, which is in process of development, is situated on locations 248 and 299AL, on Lequerre lake, $2\frac{1}{2}$ miles from Reserve bay. The owners are James Hammond, Napoleon Roy, Jerry Savard, and Adolphe Lequerre, and the operators under option are Mrs. G. A. Sweny, together with the before-mentioned owners. The manager is Roy Sweny. The force employed consists of 13 men. The workings comprise an inclined shaft (85°) 81 feet deep, eight feet square in cross section inside the timbers, and two test pits each 15 feet deep, one being 200 feet east and the other 200 feet west of the shaft. Hoisting is being done by a steam hoist with a $\frac{3}{8}$ -inch wire cable, wound on a 20-inch drum. Kibbles and skidway are used. Date of inspection, August 30, 1898.

Location AL283.

This is a prospect being developed by what is locally known as the "Railroad Co." It is on location 283AL, about $2\frac{1}{2}$ miles from the Roy mine. The shaft has been sunk 75 feet on a 45° incline. Hoisting is done by hand windlass. Eleven men are employed above and below ground. Date of inspection, August 30, 1898.

Tabor Mine.

This property is in the New Klondike region, on location 258SV, about 25 miles s. s. e. from Wabigoon. The owners are James Tabor, *et al.*, and the operators on option are the Eastern Townships Mining and Development Co., of Sherbrooke, Que. A shaft has been sunk 60 feet on an 80° incline; cross-section inside timbers five feet by eight feet. Hoisting is done by hand windlass. Some stripping on the surface has also been done. The manager in charge is H. B. Aylmer. Date of inspection, September 2, 1898.

Location 419HW.

This property is in process of development by the Northwestern Ontario Exploration Co., of 16 Eldon street, London, E.C. It is on location 419HW. The shaft is 100 feet deep, well timbered, vertical. Hoisting is done by steam, with kibble. The manager is S. F. Franc. Date of inspection, September 3, 1898.

Other properties in the New Klondike group which were idle at the time of my visit are the Hale and Lowrey and the Monroe and Kirk mines. Some stripping is being done on the latter (location 416HW), and operations will be recommenced here shortly.

Triumph Mine.

This property lies eight miles s.e. of Rat Portage, and was on the point of being abandoned at the time of inspection. The shaft had been sunk 100 feet, and drifts had been run east and west about 40 feet on the vein. A steam hoist with 24-inch drum and $\frac{3}{4}$ -inch cable was employed. The work had been well done in all details, and the mine was in good condition as to drainage and ventilation. A tendency of the roof in

the drifts to scale was observed, and caution was urged against danger from roof-falls. Date of inspection, August 7, 1898.

Regina Mine.

The staff remained the same as at the last inspection, and 24 miners and 28 surface men were employed. Sinking in the shaft had been discontinued at a depth of 434 feet. The manway is suitably cased off, and provided with platforms and ladders in conformity with the requirements of the Mines Act.

The new work consists of the following:

Fourth level, north drift 75 feet, south drift,

Record of new Work. 254 feet; fifth level, north drift,

48 feet, south drift, 178 feet; sixth

level, north drift 230 feet, south drift 216

feet; seventh level, north drift 38 feet, south

drift 50 feet. A cross-cut in the sixth level,

north drift, 14½ feet from the shaft, runs 31

feet east, and a cross-cut in the second level,

387 feet from the shaft, runs 13 feet west. In

the seventh level, on the east side of the shaft,

a chamber has been cut for the pump. At

the end of the third level south drift an up-

raise is carried 60 feet on an incline of 45° to

the south, and then vertically 15 feet, connect-

ing with the second level 300 feet from

the shaft. Overhand stoping is also being

carried on in the south drifts on the fourth,

fifth and sixth levels. Very little timbering

is required in this mine, and such as is em-

ployed is well set. Drainage and ventilation

are both satisfactory.

Six drills are used underground, being

supplied with compressed air from a new 10-

Machinery and the Mill. drill air compressor put in by the

James Cooper Manufacturing Co.

of Montreal. A new head frame has been

erected over the shaft and a new hoisting

engine house has been built adjoining the

shaft house. The mill has been radically

remodelled and new machinery installed, as

follows: One Gates' gyratory crusher, No. 3;

one conveyor belt 18 inches wide, carrying

ore from the crusher 40 feet to the ore bin,

the latter having a storage capacity of 200

tons; seven 2-stamp Tremaine mills, with

step-lips and apron plates for amalgamation;

two 3-compartment Hartz jigs, size of screens

two feet eight inches by one foot four inches,

350 strokes a minute, length of stroke decreasing from ¼-inch in the first compartment to ⅛-inch in the third compartment; two Berdan pans for grinding concentrates, diameter four feet, weight of drag 270lb; six gyrating amalgamating tables, four feet by eight feet; four cyanide leach vats, six feet deep by 13 feet diameter; four solution vats; two new 125 h.p. boilers; two engines, 7-inch by 10-inch cylinders, and 250 revolutions per minute, and one extra engine for emergencies. A new dock has also been constructed on the lake front west of the mill.

Instructions were given to keep all dynamite underground under lock and key, and

Instructions. not to continue sinking in the present shaft without authorization

from the Bureau of Mines to do so with the

present method of hoisting.

Sultana Mine.

The staff at this mine consisted of M. T.

Hunter, superintendent, Albert Johnson,

mine captain, James Gale, mill foreman, and

C. Garnett Rothwell, chlorinator.

The new work done underground since the

last inspection is the following: Third level,

Record of new Work. south drift, stope carried up to the

second level; second level south

stope working toward the shaft; at a distance

of 18 feet below the second level in the S.E.

wall of the south drift stope, a chamber had

been cut for a diamond drill, and cross-cutting

is about to be commenced to run from this

point to a new ore body discovered by the

diamond drill. In the fifth level, south

drift, the stope has been carried to within 18

feet of the fourth level. The direction of the

level has changed to the west, and at the

angle an arch 30 feet thick and 12 feet wide

has been left to sustain the hanging wall.

In the sixth level (63 feet below the fifth)

drifts have been extended north and south.

A sinking pump in the sixth level, a pump in

the fifth level and a new Northey pump,

5-inch suction and 4-inch discharge, in the

fourth level, south drift, 30 feet from the

shaft, serve to keep the mine unwatered.

Drainage and ventilation are very satisfactory.

Dynamite is kept in the fourth and fifth levels under conditions of insecurity which led to the requirement that explosives should be kept in lockers, and at a distance of at least 25 feet from lines of traffic.

The surface plant remains unchanged. Additional advice and recommendations given were to post up a signal code at all levels below ground where work is in progress ; to prohibit persons from riding up and down the shaft in the skip except in emergency cases ; to shut off the second level s.w. drift, and to introduce some form of detaching hook to prevent overwinding in hoisting, or else that some equivalent safety device be used. Date of inspection, September 8, 1898.

Mikado Mine.

This mine was under the superintendence of Theodore Breidenbach, since resigned, with H. Patterson as assistant superintendent.

No. 1 shaft, depth 240 feet. The manway is not properly cased off below the 120-foot level. The first level is unchanged since last inspection. The second level, north drift, is unchanged ; south drift 310½ feet. The third level (240 feet down) is cross-cut 11 feet east. The stope on the second level south, overhand, No. 1, is 110 feet s. from the end of the crosscut, length 150 feet, height 35 feet, width seven feet on an average. No. 2 stope is 180 feet south, length 50 feet, height 25 feet, width three to 12 feet. No. 2 shaft has a depth of 180 feet. In No. 1 level the south drift is 130 feet, and the north drift 140 feet. No. 2, at the bottom of the shaft, south drift, 31½ feet, north drift 36 feet.

Stopes, first level, north drift, overhand, 25 feet from the shaft, length 60 feet, height 24 feet, width five feet. Ventilation is good and the drainage fair. Explosives are not stored underground, a supply being sent below only when ready for charging holes. The magazine is one-fourth mile from the shafts.

Hoisting in No. 1 shaft is by kibble in the south compartment to the 240-foot level ; by

cage in the north compartment to the 120-foot level ; in No. 2 shaft a kibble is used with a 5-pole skidway,

The dressing rooms of No. 1 shaft are well appointed. No. 2 shaft dressing room is in the engine house. Excavations are being made for the foundations of a cyanide plant which was to be installed promptly.

Advice and recommendations were given to post up a signal code at all levels where work is going on in both shafts, and at the shaft mouth ; to fence off the north drift of the 120-foot level, No. 1 shaft, to prevent access of miners thereto ; to hoist by skip instead of kibble if sinking is continued in No. 2 shaft below the 180-foot level ; to provide better facilities as to ladders and platforms in the manway of shaft No. 2 within six months ; to inspect the timbers in No. 1 shaft above the 120-foot level to guard against danger from that source ; and to case off the manway in No. 1 shaft below the 120-foot level. Date of inspection, September 21, 1898.

Cameron Mine.

This is a property in process of development on locations 170 and 172S, both being islands in Shoal lake, an arm of the Lake of the Woods. The mining operations are being conducted on 170S, this island containing about nine acres. The owners are the Cameron Islands Mining and Development Co., Limited, with its head office at 71 Victoria street, Toronto. The president of the company is O. E. Foster, of Buffalo, N. Y., and the manager is H. B. Hunt.

The underground work consists of a shaft, 75° incline to the east, 120 feet deep, cross section 12 feet by 7 feet. A properly appointed manway is provided to within 30 feet of the bottom, and hoisting is done by kibbles on a double skidway extending to within 20 feet of the bottom. The shaft is collared 20 feet by well-set timbers, and this collar is carried up four feet above the surface. No. 1 level is 62 feet below the surface ; north drift 38 feet, with a cross-cut west 14 feet long, slanting 20 feet from the shaft ; south drift 42 feet long. Two small shafts have also been sunk, called No. 2 and No. 3. Shaft No. 2 is located 250 feet south of

the main shaft on the same vein; depth 10 feet. No. 3 shaft is on No. 4 vein on the west side of the island; depth 10 feet. No. 1 open cut on No. 1 vein, length 20 feet, width three feet, depth three feet. No. 2, on No. 2 vein, length 30 feet, width three feet, depth three feet. A tunnel on the east side of the island has a length of 66 feet, direction west.

Drainage in the main shaft is excellent, but the ventilation is poor. Work had been suspended until an air compressor plant could be installed, which would supply needed air as exhaust from the drills.

The surface plant consisted of the following: A well constructed pit-head frame, with sheave 29 feet above the surface; an engine and boiler house adjacent to the head frame, with a 15 h.p. duplex hoist, 16-inch drum, winding a $\frac{3}{8}$ -inch wire cable; a tramway 40 feet long from the shaft house to the dump; blacksmith shop, office and quarters for miners; and a wharf on the east side of the island with 30 feet frontage. Changes were suggested in the signal code to avoid misinterpretation of signals, and it was required that the signal code should be posted up in the engine room, at the shaft mouth, and at all loading stages below ground. It was also pointed out that while hoisting by kipples on skidway is not inadmissible while prospecting, it would not be permitted when permanent mining operations had been begun. Date of inspection, September 20, 1898.

Emperor Mine.

The Emperor mine is in process of development. Its location is three miles north of Mine Centre, between Shoal and Bad Vermilion lakes. It is owned by the Standard Gold Mining and Development Co. of Minneapolis, Minn. The manager is J. C. Beebe. A vertical shaft has been sunk 125½ feet. The first level has been run out at a depth of 75 feet, the north drift being 29 feet long, and the south drift 43 feet long. A cross-cut has been driven 41 feet southwest from the south drift, beginning 16 feet from the shaft. The manway has been carried down in proper form to the first level. Unwatering is accomplished by hoisting in buckets. Ventilation is satisfactory. Hoisting is done by kibble,

using a $\frac{3}{8}$ -inch wire cable wound on an 18-inch drum of a duplex hoist. Power is supplied by a 30 h.p. upright boiler. Storage and handling of explosives are done in a proper manner. It was required that the signal code should be posted below ground, and that men should not be hoisted or lowered in the kibble. Date of inspection, September 12, 1898.

Golden Star Mine.

This property is situated 4½ miles N.E. of Mine Centre, near the shore of Bad Vermilion lake, on locations 114 and 116AL. The surface rights of the location 41JO adjoining have also been leased for a site for a stamp mill. The owners are the Golden Star Mining and Exploration Co. of Ontario, Limited, with head office at Duluth, Minn. The president is A. C. Hubbell, and the superintendent is R. A. Kerr.

The shaft is 318½ feet deep, with a manway cased off to the fourth level. The new work since last inspection consists of the following: Third level, north drift, extended to 110 feet. Fourth level, at a depth of 400 feet; south drift 22½ feet; north drift 22 feet. All drifts are seven feet high, varying in width from four to 15 feet. A cross-cut has been run 12 feet east from the third level north, beginning 60 feet from the shaft, and another 90 feet from the shaft, five feet west. An upraise has been driven 15 feet in the third level north to connect with a winze above.

The additions to the surface plant are a 6-drill Rand air compressor, being set in the new mill, the compressed air to be conducted to the mine through 3,000 feet of 5-inch pipe. The new stamp mill contains the following rooms: battery room 37½' by 43' 8", vanner room 37½' by 40' 4", engine and compressor room 37½' by 36', boiler room 30' by 40'. The plant consists of a No. D Comet crusher, two batteries of 1020 lb. stamps, with Challenge ore feeders, the mortars set on cast iron mortar blocks weighing 14,000 lb. each, two Browne's sizers for pulp, four Frue vanners with 6-foot plain belts, one Corliss engine, 12" by 36" cylinder, 96 revolutions, and one 80 h.p. return tubular boiler.

An Otto aerial tramway, 2,700 feet long, will carry the ore to the mill, the carrier cable for loaded buckets being $1\frac{1}{2}$ -inch diameter, and that for empties being $\frac{3}{4}$ -inch diameter, and the traction cable $\frac{3}{8}$ -inch diameter. Fourteen buckets will be used, each having a capacity of 600 lb. The power will be supplied at the mill.

An assay office, manager's office and new boarding camp have also been constructed.

The requirements made were to post up signal code at landing and loading stations below ground, to scale the roof in all working drifts and cross-cuts, to

Instructions. make some repairs to the manway, to place a guard rail on the north side of the platform at the winze in the second level, and to install a skipway to replace the existing kibble and skidway, hoisting by kibble to cease on or before January 15, 1899. Date of inspection, September 14, 1898.

Olive Mine.

The Olive mine is situated on the south shore of Little Turtle lake, lower Seine river, on locations 60, 61, and 69G, and 439P, $8\frac{1}{2}$ miles N. E. of Mine Center. The owners are The Olive Gold Co. of Seine River, Limited, with its head office in Winnipeg. The president is Hon. George E. Foster, and the superintendent is W. A. Preston.

The new work in the mine since the last inspection consists of 36 feet of drifting east on the second level. Stopping has also progressed in the first level east, 13 feet from the shaft. Length of stope 78 feet, maximum height 28 feet width averaging three feet. Barren rock is being filled into the stope to permit of safely opening it out to the surface. A steam jet ventilator is used, and drainage is effected by a self-filling bail. A pump is about to be set in a chamber near the shaft on the second level. The management of explosives is excellent.

Hoisting is done by kibble on skidway, using a $\frac{3}{8}$ -inch wire cable wound on the 24-inch drum of a 16 h.p. duplex hoist.

Requirements. No changes have been made since the last inspection in the surface plant. It was required that the signal code must be posted in the engine room, at the shaft mouth,

and at all loading stations below ground; that filling in of waste rock must be rigidly adhered to if the cap rock over the upper stopes is to be removed, and that further sinking in the shaft must not be done without installing a skip and skipway without special permission from the Bureau of Mines. Date of inspection, September 15, 1898.

Alice A. Mine.

This property is on the Little Turtle river, about nine miles from its mouth. It is owned by the American and Canadian Gold Mining Co. of West Superior, Wisconsin. The president is J. S. Hillyer, and the superintendent George L. Robbins. The workings consist of shaft No. 1, 46 feet deep, with a cross-cut north 30 feet at a depth of 40 feet, and shaft No. 2, 200 feet east of No. 1, 70 feet deep, with a cross-cut at a depth of 60 feet running 19 feet south. The property was not in operation at the time of my visit. A mill consisting of two 2-stamp Tremaine mills had been ordered. Date of inspection, September 16, 1898.

Independence Mine.

The Independence mine is on the south half of lot 11, third concession, and fractional parts of lots 11 and 12, second concession of Bennett township, $3\frac{3}{4}$ miles from Seine river, 18 miles above Shoal lake. The owners are the Independence Mining and Development Co. Limited, of Sparta, Wisconsin. The president is T. O. Thorbus, and the manager, A. N. Rice. The shaft on lot 11 in the third concession is 75 feet deep, but has been abandoned. A new shaft is about to be started. A log-railroad serves as a tramway for bringing ore to the mill, one mile distant. A 5-stamp mill was in operation on the shore of a small lake by the mining camp. The additional plant consisted of a six-foot Gates vanner, a vertical 20 h.p. boiler and 15 h.p. engine. Date of inspection, September 13, 1898.

Burley Mine.

This property was being operated under the superintendence of R. H. Flaherty. At the time of my visit the rock in the lake bottom had just been entered, and a seal against the lake waters had been effected. A coffer dam had been

Description
of the Works.

constructed and forced down inside the former crib, and flat timber had been driven from the inside into the outlying silt around the bottom of the coffer dam, thus filling up the spaces between the lower edge of the coffer dam and the unequal surface of the rock. The silt having been pumped out, sinking was carried on to a depth of $17\frac{1}{2}$ feet below the coffer dam, being 12 feet below the lake bottom on the lower side of the sloping rock. A cement wall was then carried up from this depth to a height of 36 inches above the rock, from which point a clay puddle wall was to be continued to the top of the crib. The cement wall was 36 inches thick, and effected a perfect seal against an influx of water. The shaft as planned was to be six by 12 feet inside timbers. The work was being conducted with great skill, and was apparently secure in all respects. Date of inspection, September 9, 1898.

Silver Mines.

After having been closed down for several years, work was resumed on several of the silver properties in the Lake Superior region last year, but only one was an actual producer at the time of my visit. At the East End Silver Mountain ore previously extracted was being milled in a battery of two Tremaine stamps, but the mine itself was closed.

West End Silver Mountain Mine.

This mine is on locations 55, 56 and 57 R, 40 miles w.s.w. from Port Arthur and one mile from the Silver Mountain station on the P.A.D. & W.R. It is owned by the West End Mining Co. of St. Paul, Minn., and is operated by the West End Mines Syndicate, of Silver Mountain, with Herbert Shear as manager.

The underground workings are the following: Shaft No. 1, said to be 150 feet deep; partly filled with water, and unused. Shaft No. 2 is located 540 feet east of No. 1, and inclines 80° toward the north. The depth is reported to be 150 feet. Below the third level it is filled with water. Shaft No. 3 (miscalled a shaft) is a winze in the old adit level. Shaft No. 4, located 800 feet east of shaft No. 2, has been abandoned and little is known of its condition below

ground. In shaft No. 2 the first level is 35 feet from the surface; east drift 105 feet; west drift 127 feet. The second level is 60 feet from the surface; east drift 30 feet; west drift 212 feet. The third level is 90 feet from the surface; east drift 200 feet; west drift 380 feet. All underground haulage is done in this level.

Winzes connect the first and second levels west of shaft No. 2; there are similar connections from the end of the third level west to the drift from shaft No. 1; and in the end of the adit in the gulch east of main workings there is a winze 14 feet deep (known as shaft No. 3.)

Adit No. 1 is driven from the south side of No. 2 shaft north to the first level east. No. 2 on the north side of the gulch is 450 feet east of No. 2 shaft, extending north, cross-cutting a series of parallel veins, length 90 feet.

In the second level west, overhand stoping has been begun. In the third level west are three stopes: (a) 54 feet long, five feet wide, and for 14 feet of its length it has been opened through into the second level; the remainder of the stope is eight feet high above the stulls. (b) 40 feet long, five feet wide, 20 feet high. (c) 30 feet long, five feet wide, 18 feet high.

The shaft timbering is secure. The collar is 18 feet deep, planked up inside; the stulls are sound and fairly well set; and the ore chutes are well cribbed up.

Drainage is effected by a No. 5 Cameron steam pump. Ventilation is adequate for present workings. Storage and care of explosives are satisfactory.

Hoisting is done by kibble on an inclined plane made of 6" by 6" timbers laid skin to skin on the footwall of the shaft.

The hoisting engine is a 10 h.p. 28-inch drum, single cylinder, and an indicator shows the position of the kibble in hoisting. Steam is derived from a 20 h.p. vertical boiler. A new stamp mill is in process of erection. The plant consists of a Blake crusher, 7" by 10" jaws, two batteries of 950 lb. stamps, two Challenge ore feeders, four compartment Browne's hydraulic sizer, three Frue vanners, six-foot belts, one Conway automatic cut-off engine 150 h.p., and one 60 h.p. return tubular boiler.

A trestle tramway from the mine to the mill, with extension to the dump, aggregates 250 feet in length.

The requirements made were to post up the signal code at all loading stages below the cable to show the position of the kibble in hoisting, and to install a skipway and skip if work is continued in the shaft below the present third level. Date of inspection, August 24, 1898

Quarries.

Building stone is taken out in various parts of the Province and some of the quarries are extensive, but for lack of time I was only enabled to visit those in Hastings county, north of Belleville.

Crookston and Point Ann Quarries.

These quarries are being operated in Trenton limestone at Crookston, having connection with both the C.P.R. and the G.T.R. The superintendent is H. Quinlan. One hundred men are employed, of whom 35 are quarrymen, 45 stone-cutters, and 20 miscellaneous laborers. Six 10-ton derricks are set up, four being in constant use, each derrick having a 70-foot mast and 60-foot boom. There is also one steam derrick of modern type, with

three drums, one for hoisting, one for handling the boom, one for swinging the derrick. Two steam drills are employed in addition to hand drilling. A well constructed powder magazine is located one-eighth of a mile from the quarry. The maximum quantity of powder stored at any one time is ten 25-lb. kegs. The drainage and general arrangements of the quarry are excellent.

Gibson's Quarry.

This is adjacent to the Crookston and Point Ann quarry, and has connection with the G.T.R. The superintendent is Patrick Varley. About 84 men are employed, of whom 12 are quarrymen and 60 stone-cutters. Two derricks with 87-foot masts and 75-foot booms, and two with 75-foot masts and 70 foot booms are now in place, and three steam hoists, 24 h.p. each, are being installed. The quarry is worked in four benches, and is well laid out and operated in all details. The powder magazine is a secure building of stone, but is defective in the matter of ventilation, and is also rather dangerously near the dwellings of the workmen. Attention was called to the need of ventilation in warm weather, and to the impropriety of keeping fulminates in the same building with the blasting powder. Three steam drills are in operation in this quarry.

MINES OF NORTHWESTERN ONTARIO

By James A Bow, Inspector

Introduction.

I HAVE the honor to submit herewith my annual report for 1898.

Three trips were made over Western Ontario, during each of which all working mines and most of the properties under development were visited, besides a number of prospects upon which little or no work had been done. The first trip was commenced in the latter part of May. I was accompanied to a large extent by Mr. J. W. Bain, of the School of Practical Science, who was holding prospectors' classes at several of the more important points in the district, besides giving lectures at some of the principal mines. The second tour began on August 20. This was made in company with Prof. Courtenay DeKalb, Inspector of Mines for Eastern Ontario, who made one trip over the whole Province. The final tour was commenced in November, and trips to the various mines were made at convenient opportunities, the work of preparing my annual report being proceeded with during the intervals of my stay at Rat Portage. Usually from six to eight weeks is required to make a complete tour.

Inspections during the Year.

Nearly all travelling can now be done by railway, steamboat or stage, although the canoe has yet to be resorted to in a number of cases. The steamboat service is a conspicuous feature of the larger lakes of the district, owing its existence, of course, to a large extent to the mining industry, and being, on the other hand, essential to the latter. There are said to be over sixty steamers of all sizes on Lake of the Woods, having headquarters at Rat Portage. Many of these are owned by mining companies, and others are supported by trade with the mines. A considerable volume of trade is carried by steamers from various

Modes of travel to the Mines.

points of railway connection, such as Rat Portage and Wabigoon on the C.P.R. and Tower, Minn., on the D. and I. R., to Mine Centre, the headquarters of the Lower Seine river mining industry, forecasting the inevitable impetus which this part of the district (as well as the country all along the route) will receive upon the completion of the Ontario and Rainy River Railway, now under construction. Even for pleasure parties the accommodations from Rat Portage to Mine Centre are very good, and the trip is a delightful one. A steamboat line, with two portages, has been established between Wabigoon and Mine Centre, *via* the Manitou lakes, communicating with all points on the latter where properties are under development. In the winter time all important points at any distance from the railway are reached by stage. Most of the mines of course have their own teams. The only advisable way of travelling to Mine Centre in the winter time is *via* Tower, Minn., from which point it is connected by a stage line, the trip being made in two days, and a stage leaving both ends of the line three times a week. An effort was made to run a regular stage from Wabigoon, but this was given up, although it may be done next winter. Considerable judgment has been exercised in the cutting of Government roads during the year for mining purposes; these have been made just where needed, and have been of great service to those to whose properties they facilitated access. Regular stages run where business demands, with suitable stopping places for travellers.

Western Ontario has been within the last year suffering to a certain extent a relapse from the mild boom which existed during 1897; but, as the boom was not very extravagant, neither is the relapse very disastrous. And the present is

State of the Mining Industry.

after all a much more healthful condition of affairs for the laying of the foundation of a large and permanent mining industry, to which this district can, judging by the present rate of progress, look forward to in the not very distant future. Although the history of mining here is scattered over nearly twenty years, the bulk of the industry has grown up within the last two or three years, chiefly under the impetus of the boom of two years ago. But one of the injurious offsets to the benefits of the boom was that all properties were held at such extravagantly high figures that much desirable capital was kept out of the country, owing to the inability of investors to make reasonable terms with property holders; the latter have come to realize their mistake in this respect, but too late to retrieve past opportunities. Another unfortunate circumstance is that many valuable properties are in the hands of parties who have neither the means to develop them properly themselves, nor will accept reasonable terms from those who have; but this seems to be an unavoidable condition of affairs. And lastly, it is a regrettable occurrence for such a comparatively young mining country as ours that large amounts of capital from good sources have been expended in developing and prospecting properties which have not turned out satisfactorily; this, along with the other foregoing facts, resulting in more than one representative of capital having withdrawn from the field altogether. Nevertheless there is plenty of vigor left in our mining industry, which is expanding slowly, but sufficiently fast for those whose interests are locked up in the future welfare of the place. We have now three mines with shafts over 400 feet in depth, one other nearly 400 feet, and three others over 200 feet, besides several between 100 and 200 feet, all working except one. The above does not of course include the many other properties where work is in various stages of progress, two of which have mills working on large deposits which will not require underground development. Since last year the following additional stamps have been put in: In the Lower Seine, 25 gravity stamps, and one Tremaine battery of two stamps; on Lake

of the Woods, six Tremaine batteries of two stamps each; in the Manitou, one Tremaine battery of two stamps; in the silver district, west of Port Arthur, 10 gravity stamps. The silver mining industry seems to be reviving again at a fair rate. The West End mine is mining, milling and shipping continuously. The Rabbit Mountain mine has lately been acquired by a new company, and sinking in the shaft has commenced. I am also informed that two others of the old mines have been opened again.

Mines on Lake of the Woods.

A geographical classification is most convenient in giving a description of mines, and I begin with those on and near to Lake of the Woods, which is the oldest of the gold mining regions of Northwestern Ontario.

Sultana Mine.

No alteration has been made in the surface plant, or in the management or ownership of the Sultana mine, which has been running steadily and smoothly ever since the new 30-stamp mill has been in operation and the new hoisting plant installed. The chlorination plant, which runs only in the summer time—the capacity (seven tons of raw concentrates per day) being sufficient for the treatment of a year's product from the mill in the summer months—was put into operation on May 15, and closed down in the early part of October.

The owner and manager of the mine is John F. Caldwell; agent, M. T. Hunter; chlorinator, C. G. Rothwell; mine captain, Albert Johnson; and mill superintendent, James Gale. The total force is 78 (including 39 working underground) in the summer time, and 65 in the winter when the chlorination plant is not in operation.

The shaft has been sunk to a total depth of 400 ft., and will be continued. Unexpected changes in the ore body have led to important variations in the underground workings. The latest developments appear to show that the ore body is a large irregular chimney extending through all the levels from the second down. It is first encountered at a distance of about 150

Plant and
Management of the
Mine.

Extent of
the Ore body
as shown by
Workings.

feet from the shaft in the second level south, and in each succeeding level is found closer to the shaft, showing that it is pitching in that direction, until it meets the shaft between the fifth and sixth levels.

No further work has been done on the vein in the first level; but the south drift, which is 104 feet in length, has been opened again for tramming purposes. The cross-cut, which is 36 feet in length from the end of the drift to the air shaft, is being extended east to cut a parallel vein. It had been driven 113 feet on November 11, the date of my last visit, and the vein is expected to be cut within the next few days. The vein in question is a narrow quartz lode outcropping along the face of the hill behind the mill. A shaft had been sunk to a depth of 60 feet on it about three years ago, and abandoned.

In the second level, which is 127 feet from the surface, the north drift had been driven 54 feet and discontinued for over two years, but is once more being extended to cut an ore body at an estimated distance of 450 feet from the shaft.

The main excavations underground can hardly be described in terms of drifts and stopes, as is usually the case, on account of their want of uniformity in shape and the irregular method of mining necessarily employed in such an uncommon, and, to a large extent, erratic occurrence of ore. Each drift going south from the shaft opens into a large chamber representing excavations in the ore chimney or shoot constituting the main ore body as described previously.

The method of mining consists of running a drift from the shaft to the ore body, and into the same; raising to, or sinking from, the level above for ventilation and from this winze drifting south along the vein at a distance of 15 or 18 feet below the level above, leaving that much rock for a floor to the level. The drift is opened out to the full width of the vein, and the ore underneath removed by underhand stoping, keeping the drift 15 feet in advance of the stope. By this means a firm roof is left as the excavation proceeds, all loose rock being scaled off before stoping below.

The south drift of the second level extends for a distance of 110 feet, with a height of seven feet, and a width of from eight to 12 feet, opening at the end into a large chamber 40 or 50 feet in width, 120 feet in length and from 15 to 30 feet in height, extending also downward to the level below, a distance of 60 feet. Underhand stoping, with removal of the floor between the second and third levels, had been going on during the past summer, and this part of the second level has been abandoned for the present after being properly fenced off. A small drift extends 35 feet south from the large chamber, making the total distance from the shaft 260 feet.

No further work has been done in the third level north, which had been driven 13 feet. South of the shaft a drift seven feet in height and from six to 12 feet in width extends from the shaft to the stope or chamber, a distance of 100 feet. The stope is about 100 feet in length, from 30 to 60 feet in width and has been opened through to the second level. The total distance from the end of the stope to the shaft is 230 feet. Work here has been suspended for the present.

The fourth level, 262 feet from the surface, has been driven north 85 feet, and this drift abandoned. South of the shaft 50 feet of drifting connects the shaft with the stope, which is about 100 feet in length, opened out to the full width of the vein which is from 20 to 30 feet, and extending upward to within 15 feet of the third level. The drift near the roof is kept in advance of the stope, making a total distance from the shaft 185 feet.

At the fifth level, 337 feet from the surface, a loading chamber or station has been provided, 18 by 25 feet. A drift seven feet in height by 10 feet in width has been driven north 45 feet, and from the end a cross-cut six by eight feet has been driven west 18 feet, and discontinued. South of the shaft a drift seven feet in height by 10 feet in width has been driven 20 feet, opening in a chamber about 25 feet square, roughly, and extending to within 18 feet of the fourth level. A drift near the roof is kept 15 feet in advance of

The first Level.

The third Level.

The second Level.

The fourth Level.

The fifth Level.

the chamber or stope as in previous cases. The hanging wall here takes a sudden bend to the west, and to support it as the excavation proceeded underneath an arch of rock was left, 30 feet in depth, 12 feet in width and about 10 feet in length, at a height of eight feet above the floor of the level.

The sixth level has been established at a depth of 400 feet, with a loading chamber 18 feet square, which gives plenty of room for handling timber and continuing sinking by independent hoisting machinery with cable extending down the manway from the surface, as described in a previous report. As the shaft passes through a portion of the ore body between this and the level above the ore has been stoped out from the ends of the shaft to a considerable height from the bottom, necessitating the easing off of the south end of the shaft from the stope by a division of substantial timber 18 feet in width and extending to within 30 feet of the fifth level, with sufficient of an opening underneath for carrying on work south of the shaft. The stope is 45 feet in height, 13 feet in length and 18 feet in width. Drifting south has been carried 30 feet altogether. At the end of the drift a cistern eight feet in depth has been excavated. At the time of my last visit work was confined to making an upraise to the fifth level. North of the shaft the ore has been stoped out to a height of 18 feet, for a distance of 16 feet.

The skipway and ladderway have been carried to the sixth level with substantial timbering. The condition of the shaft is good from the surface to the bottom. A heavily timbered pentice has been constructed underneath the skipway preparatory to the continuation of sinking, for which the arrangements have been about completed.

Satisfactory ventilation is obtained by a winze connection between all the levels (except the sixth) and the air shaft.

For drainage purposes a pump stationed at the sixth level pumps to the fourth, where a new Northey pump with 5-in. suction and 3-in. delivery pipe has been installed, with cistern 20 feet south of the shaft. Water collected at the fifth level is syphoned from

the cistern there to the sixth. A considerable quantity of water is coming in through seams in the rock at the sixth level.

The condition of the mine and works as recorded in the Inspector's Book has been satisfactory at each visit; the manager and the captain complying with the Mines Act and following recommendations where required. The necessity of careful scaling of the walls and roofs of stopes and watching the same continually is repeatedly impressed upon the captain of the mine. At the time of Inspector De Kalb's visit instructions were left which will be found in his report.

Burley Mine.

Mention was made in last year's report of the Burley mine, which is on water location D191A adjoining the Sultana, and on the strike of the Sultana vein.

The property is owned by the Burley Gold Mining Company of Ottawa, Limited; head office, Ottawa; president, L. Crannel; sec.-treas., A. W. Fraser. As the public are well aware, the title to the property was acquired by the above company after much hard fighting in the courts between them and John F. Caldwell, owner of the Sultana. Work was commenced in the summer of 1897, under the management of J. Burley Smith, and continued on into the winter following, until early in February, when operations were suspended pending the decision of the courts regarding the title. This being in favor of the company, work was resumed shortly afterwards under the management of R. H. Flaherty, and has continued without intermission ever since.

Accompanying sketches (p. 64) will show the relative positions of the Sultana and Burley mines; also the construction of the shaft of the latter. The crib is 111 feet from high water mark at the nearest point on Sultana island. As the Burley company own nothing but water rights, their shaft had to be sunk in the water. The position of it was determined from the result of diamond drilling done the winter previous to the commencement of mining operations, with the drill stationed on the ice and holes bored in the bottom of the lake.

The Burley
Gold Mining
Co. of
Ottawa.

Development
of a Water
Location.

Condition of
the Mine and
Works.

The construction of the crib and shaft, etc., is as follows: There is first a crib containing

Construction of a Crib. an outer and an inner shell, the former 60 feet square and the

latter 40 feet, leaving 10 feet of space between all around, and making a total area for mining operations of 3,600 feet. The shells are constructed of eight by eight inch timber laid horizontally, skin to skin, with joints properly broken. A similarly constructed bottom has been provided between the shells, and sets of braces connect the latter every 32 inches in dep'h. The crib, which is 30 feet in height, has been sunk two or three feet into the clay, which is at a depth varying from 18 to 24 feet, according to the rise and fall of the water; the top of the crib having in consequence of the variable water level a variable elevation above the water. On December 22, 1893, this was eight feet, as marked on the sketch. There is from $3\frac{1}{2}$ to 16 feet of clay at the bottom, the variability being due to the sloping rock surface. The outer space of the crib is filled with broken stone. Inside the crib a coffer-dam has been sunk to bed rock. This is 16 by 22 feet in size, and constructed of timber sets 26 inches apart,—the timber being 10 inches square for the first 12 feet from the bottom and eight inches square for the remainder of the distance, which is to the top of the crib. Inside the coffer-dam is the shaft, which is six by 12 feet in size with three compartments, two for hoisting and a manway. For the first 15 feet of depth the shaft is timbered with sets several feet apart; below this, extending to a depth of 16 feet below the rock surface, the timbers are laid skin to skin, forming a neat and substantial cribbing. From the bottom of the cribbing a concrete seal three feet thick has been carried up to a height of three feet above the rock surface; the excavation in the rock being enlarged of course for this distance, and the seal being interposed between the rock and the crib-work. The composition of the seal is as follows: First, four feet from bottom, one part cement, three parts sand; second, four feet, the same number of parts of cement and sand with three parts of broken granite, $1\frac{1}{2}$ in. diameter; the balance has five parts broken granite.

Johnson's Portland cement is used. From the surface of the clay to the water level all the space between the crib and the shaft is filled with clay puddle, and above that to the top of the crib with broken rock. For a casing of matched lumber has been provided to confine the seepage water, of which there is not a great deal under the circumstances. A dam at the bottom of the casing collects this water, and a pipe conducts it to a cistern at the first level.

An account of the progress of the work with all the attendant difficulties, etc., up to the time of getting the crib in place and the work of sinking in the rock well advanced would form an interesting contribution to the literature of mining engineering. As stated in my last report, the crib was built on an island about half a mile from its present site, and towed out by a steamer to the point where mining was to commence. It was then sunk to the bottom by filling the outer space with broken stone, something less than 2,000 tons being required; this was transported in barges. The coffer-dam was then sunk in the centre on the "drop-shaft" principal, that is, the clay was excavated underneath and the timber work allowed to descend. It was at first thought that this clay would be sufficiently fluid to allow of its being pumped out; but the case proved otherwise, and excavation methods with hoisting by bucket, were employed under considerable difficulties, owing to the pressure of the clay from the outside. The experiment was made of driving 3-in. planking all around on the outer side of the crib through the clay, with the intention of sending it through to bed rock, thus shutting off the further encroachments of this clay, and hence relieving the pressure inside; but as the depth of the clay was so great at some points the planking could not be driven through to the rock, and the attempt to facilitate operations by this means was given up. Owing to the same fact, viz., the unevenness of the rock surface underneath the coffer-dam, only a small portion of the latter rested upon the rock, but the clay was effectually shut off by driving in 3-in. planking underneath the timbers, filling in all the space

between the latter and the surface of the rock ; excavating the clay of course as the work of driving the planking was continued. A comparatively dry and clear space was thus secured for the building up of the crib work of the shaft, which was commenced from the bottom, and also for the filling in of concrete and cement, which was done concurrently with the timbering. A substantial shaft has thus been secured with comparatively little seepage of water.

The depth of the shaft below the top of the crib is now (Feb. 14, 1899) 141 feet, and sinking is being continued as fast as possible. At a depth of 110 feet a drift has been driven south 58 feet, and discontinued for the present. The next level will be 75 feet below the first. Instructions were left requiring that sinking below the second level or below the 200-foot point be done under a substantial pentice, preferably of stone. A ladderway 28 inches wide has been provided, but is not in suitable condition for travelling up and down, and instructions were left that it be properly constructed to the 110-foot level, with suitable division between it and the hoisting compartments, and a hanging or temporary ladder provided from the 110-foot level to the bottom of the shaft, so that travelling up and down may be safely effected without the use of the bucket.

The country rock is a massive porphyritic granite similar to that of Sultana island. At a distance of 35 feet from the shaft in the drift a zone of schistose rock heavily impregnated with pyrites, eight feet wide, was passed through, and will be cut again by the shaft as it is dipping towards the latter. At a depth of 60 feet a quartz vein eight feet wide, dipping 75° northwest, was passed through ; but was concealed by the casing under the shaft timbers. Both of these veins are said to carry encouraging values. There is now about 18 or 20 inches of vein matter, mostly quartz, at the bottom of the shaft.

A cistern has been excavated in the drift at the first level, and a Northey pump with a capacity of 75 gallons per minute under a 300-foot head installed.

Mining
Machinery.

There is also a small Worthington sinking pump with 2½-in. suction. Mr. Flaherty informs me that about 25 gallons per minute were coming in altogether.

Drilling is done by compressed air, two drills being in use. The compressor is a 3-drill Ingersoll-Sargeant, which also supplies compressed air for the sinking pump.

The hoisting machinery consists of a five by eight inch duplex hoist, 1,300 lb. steel bucket and a ½-in. crucible steel cable running over a 48-in. sheave. This will be replaced by a larger plant when the next level has been reached. A 85 h.p. horizontal boiler supplies the hoister, the compressor and the pump. There are two pumps on the surface ; a boiler feed pump, and a Cameron pump with 3-in. intake for fire purposes. Inclined trap doors have been provided at a distance of 10 feet above the shaft mouth, serving as gates for dumping waste rock and ore separately. Short teamways lead from the shaft to the edge of the crib.

At the manway a flue has been carried 30 feet above the shaft mouth for ventilation purposes, a good draught being thus secured.

There is a total force of 20 men, including nine miners working in three eight-hour shifts.

The following buildings have been erected on the crib. Boiler and compressor house, 19 by 40 feet, including dressing room of the Mine. 10 by 10 feet, and woodshed ; hoisting engine house, 12 by 12 feet ; blacksmith shop, 16 by 20 feet, and small store house. A gangway has been constructed for hauling material to top of crib. The boarding camps and office consist of roomy and neatly constructed buildings situated on Chien d'Or island, about a half mile from the crib ; this island, as well as the Queen Bee, close to it, belongs to the Queen Bee Gold Mining Company. The powder magazine is situated on an island at a suitable distance from the workings. The manager was instructed not to store powder on the crib ; and to keep any stored underground in a box with a lid.

Queen Bee Location.

On Queen Bee island there are two parallel veins with a strike of N. 20° E., similar to

that of the Sultana vein. The formation is granite. A shaft has been sunk 30 feet on one of these veins, which is evidently the outcropping of a chimney of ore similar to that of the Sultana. Eight or nine feet of quartz is exposed, and sinking will be continued.

Climax Mine.

On August 4 I visited the Climax mine, situated east of Heenan's point, about 10 miles from Rat Portage, with steamboat communication from the latter place. The property consists of location 325 P, containing 256 acres. It is owned by the Climax Gold Mining Company of Ontario, Limited. Head office, Winnipeg; capitalization, \$1,000,000 in \$1 shares; president, W. Redford Mulock; vice-president, Thomas Black; secretary-treasurer, B. E. Chaffey. Mr. Fred. Wagner is manager of the mine; a force of three miners is employed. Work has been going on for about a year.

The formation is hornblende schist and trap in contact with granite. Considerable test-pitting and other surface work had been done on the different veins, etc., on the property, without satisfactory results until within a short period of my visit, when a vein had been discovered crossing the contact; this has been traced for about half a mile by a number of test pits sunk at various intervals, and from all appearances is a deposit worthy of exploitation. The greater part of it occurs in the trap, into which a tongue of felsite extends south from the granite for a few hundred feet, the vein following the felsite. Where the vein extends beyond the felsite it consists of a sheared zone of greenstone and quartz, the latter cementing the fragmentary masses of the former. In the granite the vein is a simple quartz body, not very wide nor distinctly traceable for any great distance. The best part of the vein is where it is associated with the felsite. Test pits at intervals of about 100 feet show it to range from three to eight feet in width.

Visiting the property on October 11, I found a shaft in process of sinking on the vein, at a distance of about 50 or 60 yards from the contact, in the greenstone; it was

26 feet deep. There was six or seven feet of vein matter at the bottom, consisting of quartz and greenstone intimately mixed. Mr. Wagner later informed me that work ceased on October 18, a depth of 31 feet having been reached.

Hay Island Mine.

I visited the Hay Island mine on August 4, and found that a new shaft house and engine house had been built. Work had ceased, as I learned, months before, and as no one was in charge I could get no information; the doors and other entrances of the shaft house, etc., were securely boarded up to prevent entrance. From casual information I learned that the shaft has been sunk to a depth of 100 feet, with drifting north and south at the bottom, and as results were not satisfactory work was discontinued; steam hoisting and air compressing plants had been installed, but the latter has been removed. The appearance of the dump seemed to justify the statement regarding development work.

Triumph Mine.

The Triumph mine, an account of which is contained in last year's report, was in operation until the latter part of September, 1898, since when work has been suspended. A force of four miners had been employed, with Mr. Joseph Hicks of Rat Portage as manager.

The shaft, which is six by 10 feet in size, had been sunk 226 feet and discontinued. At a depth of 107 feet the first level has been established, with drifting east along the vein 36 feet, and west 42 feet; the drifts being 4 ft. 6 in. by 6 ft. 6 in. in cross section. Both drifts curve sharply to the east until about parallel, forming almost a half circle. At a depth of 182 feet the plat for the second level has been put in, but no work has been going on below the first level on account of the ventilation. A good ladder-way has been constructed to the first level, properly cased off from the hoisting compartment and provided with suitable platforms. The surface is properly fenced. A neat shaft and engine house has been built. The hoisting machinery consists of a 15 h.p. duplex hoist, with 24-inch drum, $\frac{3}{4}$ -inch steel wire cable and wooden kibbles running on pole

skidway. Steam is supplied by a 25 h.p. locomotive style boiler. The buildings consist of a boarding camp, blacksmith shop, shaft and engine house and an old mill building, not in use.

The property is reached by a road seven miles in length from Rat Portage. The travelling in summer time is bad, especially if the season is wet.

Bad Mine.

In the latter part of November I visited the Bad mine, which is situated south of the railway track at Margach, a station ten miles east of Rat Portage. Connection with the railway station is secured by a winter road three-quarters of a mile in length, and by a summer road of one mile. The property consists of location 349P, containing forty acres. It has been bonded to Messrs. Hugh Armstrong, James Hildreth and William Peters of Rat Portage; they paid ten per cent. of the buying price down, with an agreement to complete the payment in a given time, pending results of exploitation and milling. Some work had been done on the property by previous parties, the present operators having commenced on November 1. The total force is 13, including eight miners, working in three eight-hour shifts. William Peters is manager, and James Hildreth foreman.

As the ground was covered with snow a satisfactory examination of the formation could not be made; but it appeared

to consist of eruptive granite in contact with coarse-grained amphibolite; dikes of felsite cutting the amphibolite near the contact, which extends along the face of a hill about 92 feet high. The vein is an irregular lode, varying from a few inches to three or four feet in width, extending along the contact, and said to be traceable by a series of exposures occurring at intervals for a distance of 200 yards or more.

About 30 feet below the top of the hill a six by 10-foot shaft has been sunk on the vein to a depth of 70 feet, with a dip of 50° southwest. At a distance of 25 feet from the surface a drift has been driven south-east along the vein 36 feet, and one north-west 30 feet. From the end of the latter

drift a cross-cut has been driven west 10 feet; and from the same point drifting has been carried east 12 feet, along what is apparently a branch of the main vein. At a depth of 32 feet the shaft is cribbed and covered over. Two test pits, three or four feet in depth each, have been sunk on the vein, one on each side of the shaft, at a distance of 20 or 25 feet from the latter.

At the bottom of the hill a tunnel, $4\frac{1}{2}$ by $6\frac{1}{2}$ feet in cross-section, is being driven south-west to cut the vein near the shaft. At the time of my visit it was in 29 feet, and 100 feet of driving was calculated necessary to reach the vein. I learned later from Mr. Peters that this had been driven the necessary distance and discontinued.

The quartz has a yellowish tint, with a somewhat saccharoidal structure, and is evidently all high grade. In February, 1898, four car loads of 20 tons each were milled at the Keewatin Reduction Works, with results ranging from \$22 to \$24.25 per ton from the different cars; and in January, 1899, 94 tons milled at the same place gave a return of nearly an ounce per ton. An equal amount was ready for milling in February. At the time of my visit a chute was under construction from the dump to the bottom of the hill, to facilitate loading the ore on sleighs.

The buildings consist of boarding camps and blacksmith shop.

Regina Mine.

Mining and development work has been steadily progressing at the Regina mine during the past year. The milling machinery has been entirely renewed and alterations made in the cyanide works, involving on the whole important changes in the method of treating the ore, which will be dealt with later. Henry A. Pringle fulfilled the position of manager until October, 1898, when John F. Mieville, the present manager, assumed these duties. John M. Jones is mine captain, and W. H. Rudd cyanider. There is a total force of 52, including 24 miners.

With the exception of a little surface exploitation, operations have been confined entirely to the main shaft workings. Over 100

The Vein
and Work-
ings upon it.

Progress
during
the Year.

feet of stripping has been done a few hundred feet south on the main vein, which is small and ragged, corresponding to an uneven line of faulting roughly following irregular tongues of felsite extending from the granite on the north.

The main shaft has been sunk to a depth of 452 feet, and will be continued about 30 feet farther with the present hoisting plant. No drifting has been done in the tunnel or in the first, second or third levels since the former report. At the fourth level, 248 feet from the surface, the north drift has been driven 75 feet altogether, and the south 254 feet, and both discontinued for the present. At the fifth level, 298 feet down, the north drift has been driven 48 feet and the south 178½ feet. At the sixth level, 360 feet down, the north drift has been driven 292 feet and continued (the last 100 feet being directly under the lake), and the south drift 217 feet. At a depth of 420 feet the seventh level has been established, with drifting north 43 feet and south 83 feet.

Previous reports of the Bureau deal with the geological features of the vein, but a

repetition to a certain extent may not be uninteresting. It is well known that the main vein is a fissure running north and south, crossing the contact between granite on the north and trap on the south. The contact dips north at an angle of between 50 and 60 degrees, so that the shaft which was commenced in the granite passes through the contact between the third and fourth levels into the trap. The east wall of the vein has been faulted 30 or 40 feet north, leaving a contact zone of that width. A peculiar feature is that this zone represents the narrower and poorer part of the vein, which is in direct opposition to the case of the Mikado, where the ore shoots correspond to the contact zones. Another peculiar feature (mentioned in former reports) is that the vein dips west in the granite and east in the trap, so that the shaft which follows the vein changes its dip from west to east at the fifth level, which is slightly below the contact zone, the skidway being changed from one wall to the other accordingly; and the bottom of the shaft, which runs into the

west or foot wall is now vertically under the mouth.

Most of the stoping has been done south of the shaft, where a vertical chimney or shoot representing a rich and wide por-

tion of the vein passes through all the levels. From the end of the

third level south, which is driven 229 feet, an upraise inclined 45 degrees south has been made to the second level, meeting the latter at a distance of 300 feet from the shaft. Stopping north from this raise has been carried for a distance of 18 feet, with a width of four feet, up to the second level; and at the third level the vein has been stoped out north from the raise for a distance of 50 feet, with a raise of 28 feet above the roof of the drift and a width of four feet. In the fourth level south the length of the stope is 71 feet, the height 48 feet above drift and the width 4½ feet. It will be broken through to the level above as soon as possible for ventilation. In the fifth level south the length of the stope is 60 feet, the height 40 feet and the width three to nine feet, averaging about four feet. In the sixth level south the length of the stope is 52 feet, the height 35 feet and the average width about 4½ feet. The vein continues quite strong to the bottom of the shaft. At the seventh level it is seven feet wide at the shaft, consisting of solid quartz with distinct walls. This, of course, does not represent its width at all points in the level.

It was the intention of the manager to test veins on either side of the main vein, and also the latter itself, by diamond

drilling from stations underground in the main workings, and if results

were satisfactory to cross-cut and work these veins from the main shaft. One drill station was in the second level south 387 feet from the shaft, and a cross-cut had been driven west 13 feet. Stulls were set along the floor of the level, covering the stope underneath, and a tramway laid. The other station was in the sixth level north, at a distance of 145 feet from the shaft, where a cross-cut has been driven 31 feet east. A bore was to be made to the magazine vein, a parallel lode outcropping down the face of the hill about 200 feet east of the main vein. I learned later that

this diamond drilling has been completed. It was done by the Rat Portage Diamond Drill Co., under the superintendence of Mr. T. E. Smith.

Tramroads are laid in all working drifts. The manway has been suitably constructed down to the seventh level. Guard rails have been placed around the skipway at all levels except the seventh. The ventilation and drainage of the mine is satisfactory. In the seventh level a pump chamber has been provided east of the shaft in the hanging wall and a new Northey pump installed. A smaller pump is also employed at the fourth level.

A new 10-drill air compressing plant from the James Cooper Mfg. Co. of Montreal has been installed, with six drills, of which five are in operation. Very little change has been made in the hoisting plant. A substantial head frame has been constructed with chute for dumping on to the grizzly. A new engine house has been built west of and adjoining the shaft house. A new steel wire hoisting cable of $\frac{3}{4}$ -inch in diameter and 600 feet in length has been put to duty. At present there are in use two 800-pound steel ore buckets, detachable for conveyance along the drifts on trucks, two 500-pound wooden ore buckets in reserve, and an 800-pound steel water bucket.

With the exception of the renovation of the engine room and some slight alterations and additions in the battery and crushing rooms, no change has been made in the mill building, but the machinery has been entirely renewed, consisting now of the following: A No. 3 Gates crusher, operated by a separate engine with 9 by 10 inch cylinder, which also drives a horizontal conveyor belt 40 feet long and 18 inches wide, extending from the crusher to the ore bin. The latter has a capacity of 200 tons. It is wedge shaped, with one side vertical; the slanting side is six inches in thickness, constructed of two by six inch planks laid edgewise and spiked together; the vertical side is four inches in thickness of two by four inch planks laid flatwise.

Seven Tremaine steam two-stamp batteries,

with a total capacity of 75 tons per 24 hours, have been substituted for the 10 gravity stamps hitherto employed. One of these Tremaine batteries had been running for six months along side the gravity mill for comparison, before deciding upon the change. All amalgamation is outside the batteries, step lips and apron plates, the latter inclined $1\frac{1}{2}$ inches per foot, being employed. The screens are diagonal slot, 40 mesh.

The material from the batteries after amalgamation goes directly to two three-compartment Hartz jigs; size of screens $2\frac{3}{4}$ by $1\frac{1}{2}$ feet; number of strokes per minute, 450. In the first compartment the stroke is $\frac{1}{2}$ -inch, and mesh of screen 1 m. m.; in the second compartment the stroke is $\frac{1}{8}$ -inch with $\frac{3}{4}$ m. m. mesh; and the third compartment, $\frac{1}{16}$ m. m. plus, with $\frac{3}{4}$ m. m. mesh. The bed consists of galena $1\frac{1}{2}$ to two inches in thickness, with pulp one inch deep on bed. The product of the jig is of course an impure concentrate with a considerable percentage of silica but the capacity is great compared with Frue vanners, and very good results are obtained from them.

The concentrates from the first compartment of each jig are treated in a Berdan pan, of which there are two, four feet in diameter, with 24 revolutions per minute, and 270 lb. drags. The product of the latter, along with the concentrates from the second and third hutchies, then go to the cyanide works. These have been reduced to four treatment vats six feet in depth and 13 feet in diameter, with the same number of solution tanks, the tailings not being treated now as formerly. The latter are passed over gyrating amalgam tables, four feet wide by eight feet long (six in number) constructed on the same principal as those of the Keewatin Reduction Works mentioned in the last annual report of the Bureau.

The machinery is all from the Gates Iron Works of Chicago.

Power is furnished by two new 125 h.p. boilers, an old 80 h.p. boiler only kept for emergency, three mill engines (one for emergency) with seven by ten inch cylinders and 250 revolutions per minute.

The works are lighted by incandescent lamps supplied from a small dynamo with a separate vertical engine.

The new buildings consist of a manager's dwelling, store, dressing room, blacksmith shop, new hoisting engine house and additions to the mill.

A new steamboat dock has been built west of the old one.

The mine has always been found in a satisfactory condition, with usually no requisitions of importance to be made. The

Condition of the Mine. dressing room, which is situated at a convenient distance from the shaft, is roomy, well ventilated and heated satisfactorily by steam. Separate lockers with lock and key are supplied to each miner. Adequate provision is made for drying clothes. Hot and cold water is supplied in abundance, with bath tubs, etc. At the time of Inspector De Kalb's visit instructions were left which will be found in his report.

The steamer Shamrock, owned by C. W. Fraser of Rat Portage, runs regularly twice a week between Rat Portage and the mine in the summer time, and a stage line over the ice makes the connection during the winter. A half-way house has been built at Yellow Girl point, so that the trip in winter can be made in a day. The steamer Squaw still belongs to the mine, but she has been laid up during the latter part of the season.

During the summer several test shafts have been sunk on locations south of and adjoining the Regina mine, under the superintendence of Mr. T. A. R. Purchas, representing English capital; but the results were not very satisfactory, I learned, and work has been discontinued.

Lizzie Mine.

Considerable interest has been taken during the latter part of the summer in a new section of the country which has been brought prominently before the public by the reports of excellent discoveries made therein. This is situated east of Whitefish bay, in the vicinity of Sturgeon and other lakes farther north. Most prominent among the finds is the Lizzie

East of Whitefish bay.

mine, situated on a small body of water known as Elizabeth lake, west of Sturgeon lake. It is reached from Rat Portage by 55 miles of steamboat voyage on the Lake of the Woods to Whitefish portage east of Regina bay, one-third of a mile of portage into Whitefish lake, four miles on the latter to Dog Paw rapids (which may either be run, or a 100 yards portage made into Sturgeon lake), 11 miles on this lake to Elizabeth lake, and a half mile across the latter to the mine landing. The voyage from Whitefish portage to Elizabeth lake is made by a small naphtha launch belonging to the mine, 20 feet in length and five feet beam, capable of carrying 2400 lb. It makes a speed of seven miles per hour and costs five cents per mile for gasoline. It is assisted up Dog Paw rapids by two men with a tow line on each shore. A good deal of surveying has been done by different parties in the vicinity of this mine, and farther north, and some valuable finds have been reported; and it is expected in consequence that connection with the railway will be established by way of Eagle lake, which lies to the north, instead of by Lake of the Woods to Rat Portage, as the former will be very much shorter, although the work of finding the most accessible route and cutting it out has yet to be done. A stage runs from Rat Portage in the winter time.

The property of the Lizzie mine consists of locations FM73A, 74, 81, 82, 83, 86 and 87, aggregating 345½ acres. It is owned and operated by the Virginia Mining Company of Ontario, Limited; capitalization, \$100,000 in \$1 shares. The head office is Toronto. President, Edward W. Stifel; secretary-treasurer and general manager of the mine, S. H. Brochunier, both residents of Virginia, U.S. Mr. Thomas Paris is superintendent of the mine. The total force is 14, including six miners, working day and night shifts.

The discoveries on the property were made in May, 1898, and development work commenced in June following. The workings are confined to location FM73A, which comprises a point of land 33 acres in extent, jutting out into Elizabeth lake, a body of water 66 acres in area. The ground rises

gradually all around to a maximum elevation of about 150 feet above the water.

The formation consists of a hard, fine-grained, light-colored schist—the nature of which has not been determined—in contact with a coarse-grained greenstone, containing large porphyritic crystals of hornblende over a quarter of an inch across, with a few small isolated patches showing marked ophitic structure. This rock is fine grained near the contacts. Dikes consisting of siliceous porphyritic rock, of a lighter color than the schist run through the latter at various points on the location. The geology can be fairly well studied where the ground is elevated, although the main contacts occur in the muskegs

The veins are confined to the schist. The main vein has a strike of north 30° east, parallel to the strike of the schists, and traceable for 700 or 800 feet, outcropping at three or four places along its course. It varies in width from a few inches to three or four feet, and in some places breaks up into a number of small scattered stringers. What are believed to be a couple of branches are traceable by “float” quartz to the main vein, a distance of about 300 feet away.

At the northeast end the main vein outcrops down the face of the hill at the water's edge; the outcropping is traceable there for about 70 feet, taking a sudden bend eastward due to the disturbance of the schists. At an elevation of 41 feet above the lake an open cut has been made six feet wide, from one to 15 feet deep, and 39 feet along the vein, and from the end of this a drift has been driven south 33 feet along the vein. A shaft six by eight feet in cross-section had been sunk five feet at the time of my visit, October 15, and on February 8, 1899, Mr. Paris informed me that it had been sunk 68 feet. It was commenced in the open cut near the entrance to the drift. A very rich pocket containing a number of magnificent free gold specimens was struck where the sinking of the shaft commenced. The quartz has a bluish tint, is translucent, and contains copper and iron pyrites. Manganese is quite plentiful in the rock associated with the quartz.

There is an excellent mill site on the lake

close to the workings, and at a distance of 1500 feet on a small river is a waterfall 11 feet in height which is calculated to be able to furnish all necessary power for hoisting and milling when such machinery is installed.

The following buildings have been erected: Cooking and sleeping camps, office, blacksmith shop and store house.

I learned in February from Mr. Paris that a steam hoisting plant has been installed.

Bath Island Mine.

Work has been resumed at the Bath Island mine, under the management of Mr. J. F. ^{Resumption of Work.} Mieville of the Regina. Mr. C. W. Fraser of Rat Portage, who is doing the work by contract, kindly allowed his steamer, the Shamrock, to call at the island on the return trip from the Regina mine to Rat Portage. We arrived about six p.m., just after blasting, and hence I could not go under ground, as the steamer could not be kept waiting until the mine cleared; but I got the following information from the foreman:

The shaft is 100 feet deep. At the bottom drifting has been carried 16 feet in each direction on the vein. And a cross-cut has been made north to cut No. 2 vein. It had been driven 58 feet on November 9, the time of my visit, and the vein would be reached within the next few feet. A ladderway had been constructed according to the requirements of the Mines Act, with suitable division to the bottom of the shaft. There was a total force of 12 men, of whom eight were miners.

An account of this mine is contained in last year's report of the Bureau. No change has been made in the ownership, or in the officers of the company.

Locations on Camp Bay.

No work has been going on at the Bully Boy, in Camp bay, during the year. negotiations for a sale having been pending. ^{Bully Boy Mine.} Mr. Charles Stirling, a part owner of the mine, informed me that the shaft had been sunk 113 feet, with 16 or 20 feet of drifting at a depth of 60 feet. I visited the shaft, but water prevented ingress.

About a mile and a half north of Camp bay, on an extension of the road running to the Bully Boy mine, is situated a property which was being worked by the Combined Gold Mines Company of Ontario, Limited, with head office at Niagara Falls, Ont. The capitalization is \$1,000,000. President, Robert Humphreys, Lanes Mill, Penn.; secretary, M. P. Hatch, Buffalo, N. Y. The place was visited on July 9. Work had been going on since November 1, 1897, with a force of four miners under the management of Mr. A. Patterson. The formation is massive greenstone (altered diabase), with numerous porphyry dikes cutting it, due to the proximity of the granite on the east. The location on which most work has been done is S79. What is known as the Patterson vein is traceable for half a mile with a strike of nearly north and south. Two test pits have been sunk on it 40 feet apart; one to a depth of 10 feet, showing the vein to dip 30 to 35 degrees east, with an exposure of from four to five feet of quartz. Both walls are distinct, containing a few inches of oxidized schistose matter.

No. 1 vein is traceable for 500 or 600 feet on elevated ground, with a strike of a little east of north, and a dip of 65 degrees east. In width it varies from two to three feet, consisting of solid quartz. A shaft has been sunk on the vein to a depth of 58 feet, now full of water. The shaft was sunk on the footwall, and a cross-cut at the bottom showed the vein to have widened. Assays averaged \$11.

No. 7 vein, said to be traceable for over half a mile, is apparently a contact between trap and porphyry, a dike of which 15 or 20 feet wide is found here. A shaft has been sunk 24 feet on the vein, but was full of water. It is said that from two to four feet of quartz is exposed in the latter.

A peculiar deposit, which may properly be called a vein, was being tested at the time of my visit. This was a body of quartz four or five feet in thickness lying perfectly flat, covering an area several hundred feet in length by from 40 to 100 feet in width, and gradually dipping into the trap on the west side. It was apparently a vein which gradu-

ally flattened near the surface, with the upper or hanging wall removed, exposing the naked quartz for a considerable distance. Two cross-cuts 40 to 50 feet in length were made about 200 feet apart, revealing the above state of affairs. Shafts were sunk through the trap under which the vein dipped, showing the dip to get gradually steeper. One shaft was sunk 25 feet, cutting the vein, but was abandoned owing to the excessive amount of water. A test pit west of the northerly cross-cut showed the vein to exist under three feet of country rock, which consisted of felsite and trap mixed. A few feet farther west another test pit is being sunk which has not cut the vein at a depth of 15 feet. As soon as the dip of the vein can be satisfactorily established a working shaft for development purposes will be sunk at a suitable point. Satisfactory showings of gold were obtained from the vein.

At another point on the property a vein of quartz five or six feet wide, mixed with country rock, and forming a ridge, was tested by a few shots, without satisfactory results and given up.

The buildings on the property consist of cooking and sleeping camps, and several blacksmith shops situated at different points.

Boulder Mine.

About two miles south of Camp bay, on the main shore, is situated the Boulder mine, the property consisting of locations S141, FM45 and E281 and 282, aggregating nearly 400 acres. It is owned by the Ontario Boulder Mining Company of Ontario Limited, with head office at Minneapolis; president, E. T. Le Clair. The first work was done in the fall of 1897, consisting of a little test pitting in the northern part of the property. Operations were discontinued during the winter, and resumed in the spring, under the management of Mr. J. R. Gifford. At the time of my visit, July 9, there was a force of 25 men, including nine miners, working in three eight-hour shifts.

The formation is hornblende schist and trap in contact with Laurentian granite; the strike being roughly north and south, with an irregular line of contact.

The vein has a strike of northeast and southwest, crossing the contact, it is said, two or three times, and is traceable for over half a mile. At the shaft it outcrops on elevated ground for a distance of about 100 feet, running into low ground in each direction and outcropping or becoming exposed again where the ground rises.

About 200 yards from the lake and 100 feet above the water level, on location E281, a $4\frac{1}{2}$ by $8\frac{1}{2}$ foot shaft has been sunk in the vein to a depth of 30 feet, and is being continued. Sinking was progressing at the rate of 11 feet per week with single-hand drillers working in three eight-hour shifts, with three men per shift.

There is 11 feet of quartz at the surface and quartz on three sides in the shaft.

The buildings consist of cooking and sleeping camps and stable. A manager's dwelling is being built also. All buildings are roomy, comfortable and neatly built.

A dock is being constructed in a small, conveniently situated inlet at the lake. The steamer Pearl, with 42 feet keel, belonging to the mine, runs between there and Rat Portage, a distance of 55 miles.

There is a very good mill site at the lake, with excellent opportunities for the transportation of ore by gravity.

On October 22 I met Mr. Gifford in Rat Portage, and was informed that mining operations had been suspended for some time, pending the installation of hoisting and air-compressing plants. These consist of the following machinery: An 8 by 12 inch duplex hoister; a six-drill Rand duplex compressor, with three No. 3 drills; a 4 by 12 foot receiver; two 45 horse-power boilers; a 30 horse-power saw mill engine, and a boiler of the same capacity and two duplex Snow pumps.

The saw mill, which has a capacity of 10,000 feet per day, is in running order. The saw mill is an almost essential feature of any mine which is situated at a considerable distance from a railway, as usually a large quantity of lumber is needed, and the expense of transportation is considerable. The locations are well wooded with fairly heavy timber, consisting of Norway pine, spruce, poplar, etc.

The following mining work has been done: No. 1 shaft, depth 90 feet; No. 2 shaft, 1,000 feet east of No. 1 on the same vein, depth 70 feet.

A new vein with favorable assay values had been discovered 30 feet east of the main vein while cutting out the foundation for the hoisting engine house.

Some additional buildings have also been erected.

Stella Mine.

Considerable development work has been done at the Stella mine during the year, and much information obtained regarding the character of the ore bodies.

What was believed last year to be one vein has proven upon clearing and stripping to be the exposures of several parallel veins crossing the property close together. Work has been done on three or four of these.

On No. 1 vein the shaft has been sunk to a depth of 60 feet, and temporarily discontinued, after being properly fenced. The vein, which is similar to all the other veins, consists of a zone of quartz and green schist mixed, with rather indefinite walls. Assays range from \$4 to \$14. A mill test of two tons gave a return of \$3.75 free milling. There is a large quantity of concentrates, chiefly copper and iron pyrites. It is the intention to sink the shaft to a depth of 100 feet, and cross-cut to the hanging wall, the foot only being exposed.

On No. 2 vein the shaft has been sunk 65 feet, and discontinued for the present, being properly secured at the surface to prevent accident. The vein changed its dip rapidly at a short distance from the surface; at a depth of 25 feet the shaft went into the foot wall. At the bottom a drift was carried west 15 feet, and from the end a cross-cut driven south 40 feet, cutting the vein at a distance of 35 feet. Drifting was done on the vein for a distance of 10 feet west, the vein consisting of a zone of quartz and schist five or six feet wide. The shaft was full of water, but I got this information from Mr. Neil Campbell, the manager. A small shaft house has been built. Several open cuts have also been made on this vein, these being five or six feet in depth, and the vein varying from

a few inches to two feet in width in them. Twenty tons of ore from one cut gave a \$406 gold brick, and 800 pounds from the same vein gave a return of \$134 per ton at the Keewatin Reduction Works.

On No. 3 vein a shaft has been sunk 40 feet. The vein averages about two feet in the shaft, and is 18 inches wide at the surface. Operations have been discontinued here also, and the shaft allowed to fill with water. At the surface it has been properly fenced.

The main or Stella vein was the only one being worked at the time of my visit, July 11. The tunnel, mentioned in last year's report, has been driven 104 feet and discontinued. The vein ranges from two to four feet in width, averaging about $3\frac{1}{2}$ feet. Close to the tunnel a shaft was being sunk on the vein; it was then 51 feet deep, dipping 57 degrees south. The vein ranges from four to $4\frac{1}{2}$ feet in width, consisting of quartz and schist mixed. The manager states that assays run from \$7 upwards, and he believes that it will average over \$10 per ton. A suitable collar has been provided to a depth of 16 feet. A neat head frame has been constructed, and hoisting is done by horse power.

Twenty feet east of this shaft a test pit had been sunk on the vein 15 feet, but filled up again with broken rock.

The buildings consist of sleeping camp to accommodate 15 or 20 men, dining camp, stable, ice house and blacksmith shop.

There is a total force of 10 men, seven of whom are miners working day and night shifts.

A wagon road has recently been cut direct to the mine, branching off from the main road which runs to Andrew bay.

Meeting Mr. Campbell in Rat Portage on November 28, I learned that the shaft had been sunk on the Stella vein to a depth of 127 feet, and work stopped on the first of the month. It is probable that operations will be suspended until steam hoisting machinery is installed.

Triggs Mine.

On the same belt as the Stella, with similar formation and ore bodies, is the Triggs mine, situated east of Witch bay on a fairly good wagon road about $2\frac{1}{2}$ miles in length extending from a small lake which is crossed by canoe shortly

after leaving the landing at Witch bay. The property consists of three locations, McA56, 129 and 148, aggregating 113 acres. It is owned and operated by the Triggs Gold Mining Company of Ontario, Limited. President, F. D. Sargeant, St. Paul, Minn.; vice-president, J. W. Millar, Rat Portage; secretary and treasurer, J. H. Triggs, Rat Portage. I visited the place in August. Work has been going on since October, 1897, under the management of J. H. Triggs, secretary of the company.

The workings are confined to an elevated portion of ground 40 or 50 feet in height, about 150 feet in width and from 700 to 800 feet in length, surrounded by low, swampy ground. The formation is fine grained trap. The richest ore is confined to veins, and consists of zones of quartz and greenstone mixed, extending along the top of the hill with a strike of nearly east and west. There are two of these veins, one on the north and the other on the south side of the hill, about 150 feet apart: but the manager has made repeated tests, resulting in the conclusion that gold is contained to a sufficient extent and sufficiently diffused to warrant treatment of the whole mass between the veins. The quartz in the veins assays exceptionally high, and the greenstone between gives promising returns.

No. 1 vein, on the south side, has been exposed by a number of small test pits two or three feet in depth, sunk at frequent intervals, extending over a distance of several hundred feet. Oxidized material is revealed in most cases, with from a few inches to two feet of quartz. A shaft has been sunk on the vein to a depth of 80 feet, but was not in operation and was partially full of water at the time of my visit, preventing ingress. At a depth of 40 feet a drift has been driven eight feet west along the vein. Mr. Triggs informed me that the shaft followed a very rich pay streak for the greater part of the distance, but this dipped so flatly near the bottom that sinking was continued in the foot wall. Several hundred tons of rich ore have been dumped separately at the surface, awaiting the erection of a mill. A neat collar and a ladderway have been provided, and a temporary shaft house built.

On No. 2 vein, which is traceable for from 500 to 800 feet along the north side of the hill, two test pits have been sunk; one 10 feet deep revealed four feet of vein matter consisting of quartz and greenstone, charged with pyrites and said to assay well. The other, 70 or 80 feet west, was six feet in depth and 14 feet in length, exposing about 10 feet of vein matter; the vein branched here, the branches aggregating about five feet in width. Iron and copper pyrites were abundant and assays were satisfactory.

Near the foot of the hill, on the north side, a tunnel was commenced which was intended to be driven through to the south side, cutting both veins. I learned later from Mr. Triggs that this had been driven 40 feet, and work at the mine suspended, with the intention of commencing again during the winter.

The force consisted of three miners and a cook. Boarding camps, a stable and a blacksmith shop had been built.

Sentinel Mine.

On the south shore of Labyrinth bay is a property consisting of locations WA7, 8 and 9, owned by the Corondo Gold Mining Company, Limited; it is being tested under option at present by the Sentinel Consolidated Gold Mining Company of Ontario, Limited, with head office at Toronto. President, Dr. Edmund E. King; manager of company and mine, N. B. Eagen. Work has been going on since the summer of 1898. Two shafts have been sunk on WA7, one 40 feet deep and the other 106 feet; the latter one is being continued. I did not visit the property, but got the foregoing information from Mr. John McAree, O.L.S., engineer of the mine, and Mr. Hamilton Proudlock, foreman of the work. A mill run of 60 tons was made at the Rat Portage Reduction Works in February, 1898, with reported satisfactory results.

Mines on Shoal Lake.

Although Shoal lake is connected with Lake of the Woods, it deserves to be dealt with as a distinct mining region on account of the character of the rock formation which composes the greater part of the area that is

mineral bearing. The eruptive granite here is found to be fissured in many places, and a number of the veins are proven to carry gold ore that promises to make rich mines.

Mikado Mine.

The Mikado mine has been in steady operation during the year, with Theodore Breidenbach as general manager, H. Patterson assistant manager and engineer, and Mr. McMillan business manager. F. C. Pengilly is superintendent of the new cyanide works, completed on October 24, 1898. A total force of about 80 men, including from 26 to 30 miners, is continually employed.

Prospecting, sinking of test shafts and diamond drilling have been done at various points on the property, together with a study of the geology of the main veins, which has led to a systematic method of underground development in which each drift or cross-cut is driven with the calculation of striking an ore body or workable portion of the vein at an estimated distance.

Previous reports of the Bureau of Mines contain descriptions by Dr. Coleman of the rocks constituting the formation, as well as accounts of the property in general. The formation consists of altered trap with areas of intrusive granite occurring on the northern part of the property. A dike or tongue of the granite, varying from 150 to 300 feet in width, extends for a distance of about a quarter of a mile west from the main body into the trap, crossing the two main veins which are 400 feet apart, and parallel with a strike of north 30° west, outcropping for a short distance each near the shore of Bag bay. This tongue of granite dips 30 degrees south, as revealed by underground workings. The portion between the veins has been faulted or thrown 4 feet to the north, the veins representing the lines of displacement. This is shown at both veins, but best at No. 1, the west vein, and establishes beyond doubt their dynamic origin. In all the workings the continuity of the fault is evident, although generally in the trap the effect of subsequent agencies of vein formation has not been so great as in the granite, consisting for the most part of a small but

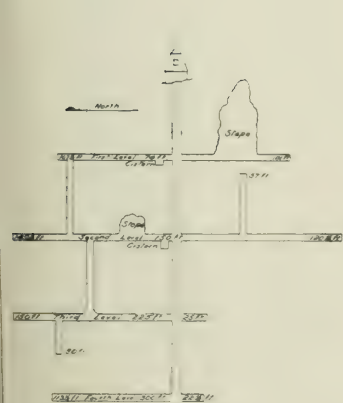
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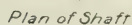
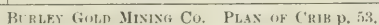
MIRADO MINE. PLAN OF SURFACE WORKS, SHOWING VEINS, CONTACTS, DISLOCATION, ETC. SCALE, 80 FT. 1 IN. p. 64.



GOLDEN STAR MINE. JAN. 26, 1899, p.76.



BURLEY GOLD MINING CO. PLAN SHOWING LOCATION OF CRIB. SCALE, 100 FT. 1 IN. p. 52.



BURLEY GOLD MINING Co. CROSS SECTION OF CASSION AND SHAFT, p. 54.

per-sistent seam of calcite with a zone of fracture several feet in width on each side. In the granite the vein opens out into a good quartz body, several feet in width, charged with pyrites and bismuthinite, and all rich enough to be workable. This applies particularly to No. 1 vein, wherein the best ore occurs in a shoot following the tongue of granite previously mentioned; although even in the trap the vein is sometimes good. In No. 2 vein the nature of the wall rock does not appear to be so influential a factor in determining the quality or width of the ore body; the workable part of the vein consisting principally of a zone of fractured felsite and trap, altered and silicified by circulating waters. Felsite occurs in both veins and is always considered a favorable indication.

At No. 1 vein a vertical shaft has been sunk in the hanging wall to a depth of 250 feet, cutting the vein, which dips east, at 180 feet. It was commenced in the granite dike, but the

Extent of
the Work-
ings.

latter, dipping to the south, left the shaft, which was continued in the trap. The cross-section is 6 by 12 feet inside the timbers, with a double hoisting compartment and a manway for a depth of 127 feet, and 6 by 8 feet with a single hoisting compartment and manway for the remainder of the distance. Levels have been established with cross cuts to and drifting on the vein at depths of 60, 120 and 240 feet. The north drift in the first level has been driven 190 feet and abandoned. At a distance of 136 feet from the entrance a cross-cut has been driven northeast 21 feet. The south drift has been driven 189 feet, passing through the granite dike, and discontinued. The ore shoot following the granite has been nearly all stoped out to the surface, leaving a pillar 10 feet in diameter to support the hanging wall. The dimensions of the stoped out space are as follows: In the south drift the length is 107 feet and height above the level floor 30 feet. North of this the ore has been stoped out to the surface for a distance of 60 feet, leaving a pillar in the centre. In the north drift the length is 36 feet and the average height above the floor about 17 feet; the average width of the stoped out portion is about 10 feet.

The north drift at the second or 120 foot

level has been driven 154½ feet and abandoned. The south drift has been driven 380 feet, passing through the granite, and is continued, as the vein is still good, at a distance of 120 feet past the ore-shoot. The first, or what is called No. 6, stope has been carried up to the first level with an average width of about four feet and an average length of 90 feet. The second or No. 5 stope is 92 feet in length, with an average raise of about 15 feet and average width of about five feet. At a distance of 190 feet from the entrance of the drift a rise has been made 25 feet above the roof of the drift, and will be continued to the level above. Suitable stulls, supported by posts in the centre where necessary, have been placed along the roof of the drift and farther upward in the stope, for retaining the broken ore which is discharged through mill-holes into cars below, tramways being provided in all working drifts.

At the third or 240-foot level a cross-cut 20 feet east cuts the vein, along which drifting has been done north 126 feet and south 69 feet. This work is all in the trap, and hence the vein is not so good, but drifting will be continued in both directions with the calculation of striking bodies of ore at estimated distances. In the south drift a stope has been made 34 feet in length, seven feet in height above drift, and three feet in width.

An intermediate pump station had been provided at a depth of 180 feet, where a chamber, dammed to hold water, has been excavated on the south end of the shaft. But the pump is now stationed in a chamber near the shaft at the 240-foot level, with 10 feet of sump to pump from.

No change has been made in the hoisting plant, with the exception that only a single cage-way exists from the second level down, as stated previously.

A suitable ladderway has been constructed to the bottom of the shaft. It was in a dangerous condition on account of ice formed by the freezing of the dropping water between the surface and the 120-foot level, and instructions were left to keep it chopped out as well as possible. The ventilation is satisfactory.

On No. 2 vein a shaft, inclined 65 degrees east, has been sunk to a depth of 180 feet.

Levels have been established at depths of 120 and 180 feet. In the first level, which is abandoned, the north drift is 140 feet in length, and the south 130 feet. The floors of the drifts are 10 feet above the floor of the loading chamber. In the north drift, 25 feet from the shaft, a stope 60 feet in length, 24 feet in height and five feet in width has been made.

At the 180-foot level both drifts are 169 feet in length, and are being continued. At a distance of 100 feet north of the shaft an overhand stope has been made 60 feet in length, seven feet above the drift, with an average width of three feet. In the south drift, at a distance of 150 feet from the shaft, a very rich pocket was struck, from which was obtained nearly 1,000 lb. of ore which contained much visible gold, a special report on which was sent to the Bureau of Mines. An overhand stope has been made 13 feet in length, about five feet in height and six feet in width, and is being continued.

A Northey pump with a capacity of 300 gallons per minute has been installed. The

hoisting plant consists of a 12 h.p. Equipment of the Mine. double drum hoist with a 30 h.p. horizontal boiler, formerly at No. 1 shaft, and a kibble sliding on pole skidway. The ore is trammed on the surface to No. 1 shaft and raised to the crusher floor. A new 40 h.p. horizontal boiler has been substituted at No. 1 for the one removed, and connected with two 70 h.p. boilers already there. Drilling in both shafts is done by compressed air, supplied by an eight-drill Rand compressor, with six No. 2 drills in use, and three receivers: one 4½ feet in diameter and nine feet in length on the surface, and one three feet in diameter by four feet in height under ground in each shaft.

Two other shafts have been sunk at some distance to the south of the main ones. One, called No. 3, is six by nine feet in size and 80 feet deep. It has been abandoned and allowed to fill with water. The other, No. 4, on the strike of the main vein, is five by eight feet in size and 65 feet deep. This has also been abandoned and allowed to fill. Instructions were given to have both shafts fenced.

No change has been made in the mill, which has been running steadily with the

The Mill and the Cyanide Works. exception of 19 days in June, when it was stopped through the breaking of the crusher, which was a Comet. A Blake, with 8 by 12-inch opening, has been substituted. The erection of the cyanide works was commenced on September 17, and completed on October 24, following; they were put into operation about a month later. All the product of the mill is treated after amalgamation, the work of the cyanide plant consisting of extracting the very fine free gold, of which a considerable quantity is carried off as float, and the gold in the sulphides, which are not concentrated as is usually the case, the amount, ½ per cent., being too small to warrant the installation and operation of the necessary concentrating machinery. The mode of treatment consists in what is known as the "double treatment process," that is to say: settling tanks are first subjected to the cyanide solution; the material is then dumped into a second series of tanks called the "treatment" tanks, and cyanide solution added a second time; all leaching being done in the latter. The plant is capable of treating 1,600 tons per month, giving it five days of actual treatment. The works consist of three settling tanks, 12½ feet in diameter and eight feet deep, three treatment tanks, 13½ feet in diameter and eight feet deep, three extraction boxes and three solution sumps; also test room and accommodation for the men; the whole covered by a roof 50 by 60 feet in size. An elevator in the mill raises the tailings from the discharge there to the top of the cyanide works. A large percentage of the slimes is eliminated by slime separators in filling the first tanks. Although there is a considerable percentage of copper in the ore, by proper manipulation of the solution a good extraction is secured without much loss of cyanide.

Mr. Pengilly, who superintended the erection of the plant, and now superintends the working of it, is highly pleased with the success achieved so far in the cost and percentage of extraction; and thinks that this method of treatment is the solution to the problem of the profitable treatment of even the low grade ores of the Lake of the Woods.

Pennsylvania coal is used in all the boilers ; it is much more convenient to handle, and the cost not much greater than the Coal for Fuel.

wood which grows in the vicinity. The chief difficulty is the transportation from Rat Portage on account of the low water at Ash rapids, but this has been remedied by the Government to a considerable extent by the deepening of the channel, and stop logs are being put in the dam on Winnipeg river, which will enable a uniformity of water level to be maintained in future.

New buildings at the mine consist of an engine house at No. 2 shaft, dressing room at

No. 1, men's sitting room, cyanide building and a number of private dwellings. A new steamboat dock and a coal dock have also been constructed.

The following instructions were left in the Inspector's Book : 1. Fence the open cut west of mill and also shafts No. 3 and 4.

These have been complied with. 2. If work is continued at the 120-foot level in No. 2 shaft, a shield must be provided overhead to afford protection to miners from material falling down the shaft. Work has been suspended in this level. 3. The ladderway in No. 1 shaft must be kept clear of ice as well as possible.

Inspector DeKalb left instructions which will be found in his report.

On a small island north of the Mikado mine in Bag bay diamond drilling had been done by a new company, with the object of testing for an extension of the Mikado vein. It is reported that very satisfactory results were obtained and that development work will be commenced in consequence.

Toronto and Western Company.

The Shoal lake property of the Toronto and Western Mines Development Company, Limited, consisting of D410, adjoining the Mikado on the east, was visited on December 27. The manager is Mr. John T. Moore, and the foreman Mr. H. F. Downing. There was a total force of 12 men, including eight miners working day and night shifts.

The formation is granite, a part of the same body which occurs on the Mikado property. The vein consists of a zone of altered granite

about four feet wide, impregnated with quartz and pyrites. Its origin is no doubt similar to that of the Mikado veins, viz., a fault in the country rock ; it is parallel to the latter veins, having a strike of north 30° west.

At a distance of about a quarter of a mile from Bag bay, with an elevation of 55 feet above the water, a shaft 7 by 11 feet in size has been sunk on the vein to a depth of 120 feet, and is being continued. The foot wall is quite plain and well defined. The dip varies from 60 to 80 degrees east. A suitable collar has been constructed to a depth of 11 feet. A neat and roomy manway with suitable ladders and platforms has been constructed to within 40 feet of the bottom, properly cased off from the hoisting compartment. It is the intention to drift at a depth of 100 feet. Blasting is done by electricity.

Well constructed shaft and engine houses have been built ; the former 20 feet square and 25 feet high, and the latter 23 feet square, adjoining.

The hoisting plant consists of a 25 h.p. duplex hoist, with steam brakes, 17-inch drum, $\frac{7}{8}$ -inch steel wire cable running over 4 $\frac{3}{4}$ -foot sheaves, a 750-pound wooden kibble sliding on a four-pole skidway and a 25 h.p. locomotive style boiler.

Ventilation is secured by a blower driven by a five h.p. engine.

Another shaft 200 feet distant has been sunk on a parallel vein to a depth of 57 feet, but work was suspended in it at the time of my visit.

The buildings on the property consist of boarding house, warehouse, ice house, barn, blacksmith shop, engine house, shaft house and powder house.

Cedar Island Mine.

The only work done at the Cedar Island, or better known as the Cornucopia mine, consists of diamond drilling, done by the Rat Portage Diamond Drill Company, H. W. Kennedy manager, and T. E. Smith superintendent. In all four holes were bored on the different veins, on the island and on the mainland, aggregating 869 feet. Mr. Smith informed me that the Rat Portage Diamond Drill

The Location and its Development.

Diamond drill Exploration.

Company have done in the neighborhood of 3,000 feet of boring on the various properties in the district this year (1898).

Ontario Limited Company.

On July 1 I visited the Ontario Limited property, and found that all work had ceased.

Walking over the property I found that several shafts had been sunk to considerable depths, and were partially full of water. As no information could be obtained I did not remain. While in Rat Portage Mr. C. W. Engledue, the manager, gave me the following notes on shaft sinking and diamond drilling up to the time of the suspension of operations.

On No. 1 vein, bore No. 1 started 76 feet north of the vein, at a dip of 79 degrees; depth of bore 220 feet on the incline, cutting the vein at a depth of 204 feet vertically. A five by nine-foot shaft had been sunk to a depth of 55 feet; the first 30 feet being vertical, and the remainder dipping 45 degrees north. On the south end of the vein a shaft, No. 1 A, $4\frac{1}{4}$ by $7\frac{3}{4}$ feet in size, had been sunk 44 feet.

On the junction of veins No. 5, 6 and 7, No. 2 bore commenced 50 feet north of junction; sunk 197 feet on incline at a dip of 75 degrees north. A shaft was sunk on the junction to a depth of 65 feet.

On No. 4 vein, shaft 5 by 10 feet in size, 75 feet in depth; vertical for 40 feet, and dipping 60 degrees north for remainder of the distance. At a depth of 70 feet a drift was made 20 feet south.

The foreman of the work was James Emmons, subsequently employed at the Burley mine in Bald Indian bay. The diamond drilling was done by the Rat Portage Diamond Drill Company.

Mr. Engledue also informed me that 50 tons of ore from the open cut near the shaft of the Gold Coin mine, of which he had charge, were milled at the Keewatin Reduction Works, without very satisfactory results.

Great Granite Company.

Since July 21, 1898, prospecting work has been in progress on the property of the Great Granite Gold Mining and Development Company of Ontario, Limited. The capital-

ization of the company is \$5,000,000; its president, General James E. Curtiss; its vice-president and general manager, Thomas W. Gleason; its secretary, D. D'E. Potter. Five thousand acres in one block, situated south of Echo bay, are owned by the company. On a few locations prospecting work has been carried on; four test pits, two 15 feet and two 10 feet deep, have been sunk on as many different veins on 248E; and on 272E a shaft is now being sunk which has reached a depth of $18\frac{1}{2}$ feet. The work is in charge of Mr. B. Leonard Thorne, who supplied me with the foregoing information.

Cameron Island Mine.

The Cameron Island mine, mentioned in last year's report, is on a small island of 16 acres, surveyed as mining location 170S, situated about six miles west of the Mikado, in Shoal lake. The property is now owned and operated by the Cameron Island Mining and Development Company, Limited, with head office at 71 Victoria St., Toronto. President, O. E. Foster, and secretary John R. Allan. Mr. William Caldwell was manager of the mine until the present summer, when Mr. William James became mine foreman and Mr. H. B. Hunt manager. At the time of my first visit, July 1, there was a total force of 20, including 15 miners, working in two shifts. A number of these were laid off later in the season, as the work in the shaft was suspended on account of poor ventilation, it being the intention to continue therein as soon as an air-compressing plant was installed. The manager informed me since that the mine was closed down until the spring of 1899, work having ceased October 1.

The formation of this island is exceptional, consisting of coarse-grained amphibolite, or probably the augitic extreme of gabbro (altered no doubt to hornblende as is the case with most rocks of this nature in Western Ontario). At several points where the rock is exposed distinct, isolated segregations of coarsely crystallized felspar occur, covering areas of a few square feet or square yards, merging gradually around the edges into the hornblende; the felspar in the zones of mergence com-

Operations
of the
Season.

Formation
of the
Island.

monly occurring in large ophitic crystals distinctly visible to the naked eye even without close inspection. As only a limited amount of the rock is exposed, there is yet much to be learned as to the relative quantities of felspar and hornblende; but the nature of the formation is evident from what is already visible.

The ore bodies, or veins as they are called, are a series of parallel dikes of felsite extending across the island with a strike of north 30 degrees east. Descriptions of these can be found in the report for 1897. The main vein reveals an interesting feature which is worthy of note. The main portion consists of light colored felsite, containing a considerable percentage of quartz, and heavily charged with iron pyrites, the whole possessing a schistose structure. Where it is exposed on the north shore it shows a width of 16 feet, which is probably the average width of the dike all over. Near the centre of this dike, running parallel with it, there occurs a small dike about two feet wide of harder and darker colored felsite, which is a later eruption, as is evident from the fact of its being enclosed in the large dike, and not being altered or silicified like the latter. This forms the foot wall of the shaft.

A 7 by 12-foot shaft has been sunk on the dike or main vein to a depth of 120 feet, dipping 75 to 80 degrees west. At a depth of 62 feet a level has been established, with a five by seven-foot drift south on the vein for a distance of 42 feet, and one north 38 feet, of the same cross-section. Twenty feet from the shaft in the south drift a cross-cut has been driven west 14 feet, exposing from 11 to 13 feet of vein matter. A neat collar has been constructed to a depth of 20 feet, extending four feet above the surface. A manway with ladders and platforms suitably arranged has been cased off from the hoisting compartment to within 30 feet of the bottom. A three-pole skidway for bucket extends to within 20 feet of the bottom, with trap door at the first level. A substantially constructed shaft house, framed of 12 inches square timber, has been built.

The hoisting machinery consists of a 15 horse-power duplex hoist, with 16-inch drum, $\frac{3}{8}$ -inch steel wire cable, iron kibble, and a 25

horse-power locomotive style boiler. Forty feet of tramway extends from the shaft house to the dump, with one Woodside Bros. iron dump car. No provision is made for pumping water, as the shaft is quite dry even at the bottom.

At a distance of 250 feet north of No. 1 shaft, on the same vein, a test pit was being sunk at the time of my second visit; it had reached a depth of 10 feet.

On the east side of the island, near the water level, a tunnel has been driven west 66 feet, cutting No. 1 vein and a branch of No. 2. These are both felsite bodies.

The following buildings have been erected: Engine house, blacksmith shop, shaft house, sleeping camp, boarding camp and office.

A steamboat dock, with a frontage of 30 feet, has been built on the east side of the island. The steamer Ethel, belonging to the mine, runs between there and Rat Portage.

Cordwood is supplied from a neighboring island, 172S, the property of the company.

The company are talking about erecting a 40-stamp mill in 1899.

On September 20, the date of Inspector DeKalb's visit, an Inspector's Book was left, with instructions, etc., which will be found in Mr. DeKalb's report.

Locations on Lake Minnietakie.

During the past year the country around lake Minnietakie has been the scene of a fair amount of prospecting activity.

Quite a number of locations have been surveyed, and on a few of these test shafts have been sunk, open cuts made, and other surface exploitation work done at various places on the lake and in the vicinity. A few days, beginning June 15, were spent in examination of some of these locations.

Access to lake Minnietakie is obtained by means of a good wagon road nine miles in length from Dinorwic on the Canadian Pacific Railway to Sandy lake, a voyage of six miles by canoe across the latter and a 15-chain portage from there to lake Minnietakie, the entry into which is at the southern extremity of a long narrow bay, extending river-like in a southwesterly direction from the main body for a distance of

Extent of
the Work
ings.

Activity on
Lake Minnie-
takie.

Entry into
the Region.

about 20 miles. An effort is being made to have communication improved by continuing the road around the eastern side of Sandy lake, where it is claimed a first class summer road only 20 miles in length can be constructed directly to lake Minnetakie, thereby avoiding the necessity of transshipping at Sandy lake. A Government road 27 miles in length has been cut from Wabigoon to lake Minnetakie, meeting it at a point a few miles north of the Sandy lake portage.

The formation of the country consists of a wide belt of green schists and trap, with Formation of the Country. quartz and felspar porphyries, altered felsite, gabbro, etc., scattered throughout, and Laurentian granite on the north and the south. The strike of the formation is northeast and southwest. The northern boundary, or the contact with the granite, occurs at some distance north of lake Minnetakie, and the southern contact crosses the southern part of the lake.

Harvey Syndicate.

Mr. E. E. Harvey of Winnipeg, representing capital from that place, has been sinking on several properties during last winter and the following summer. Burnt island, where work was in progress at the time of my visit, was the first place examined. It is situated near the northwestern shore of the lake, about 40 miles from the railroad, and has an area of a few hundred acres. The eastern portion has been surveyed into a mining location. The island is fairly well wooded for mining purposes, although a portion of it has been burnt over. The formation consists of hornblende schist and quartz and felspar porphyry. The eastern part of the location is composed of an eruptive mass of the latter. A band of hornblende schist over 100 feet in width crosses the location with a strike of northeast through the porphyry. On the contacts between these rocks the veins occur. Two have been exposed so far. The main vein is on the easterly contact and can be traced almost across the island, a distance of about a quarter of a mile. It outcrops on elevated ground all along, and stripping consists for the most part in merely removing a few trees and a little moss. The other contacts are on lower

ground, covered with several feet of earth, except at the shores where the rock is exposed. The main vein is exposed distinctly on the north shore, with a width of three or four feet. It has been stripped at several places along its strike, maintaining about the same width. The vein matter consists of quartz and porphyry mixed with a little green schist. About 200 feet from the shore, and 60 or 70 feet above the water level, a 7 by 9 foot shaft has been sunk on the vein to a depth of 48 feet, and is being continued. It is the intention to sink 60 feet and cross-cut east, as the east wall of the vein is not exposed in the shaft. There is an average of about three feet of quartz, with at least $4\frac{1}{2}$ feet at the bottom, mixed slightly with schist. The quartz is white, semi-translucent, containing plenty of iron and copper pyrites and galena. A few nice specimens containing visible gold from the shaft were shown me. The force consists of three miners and a foreman, A. Johnson. A log boarding camp comprises the building accommodation.

On a parallel arm of the lake, and at a distance of 10 or 15 miles south, is another location BJ12, belonging to the same parties, Location BJ12. where a shaft had been sunk the previous summer, and work suspended since. The vein is a contact between fine grained, massive greenstone and eruptive granite, the latter extending along in a bluff about 40 feet in height and from 50 to 100 feet back from the water. The vein dips northwest into the bluff, about half way up the face of the same. The shaft, which is vertical and was started on the hanging wall side, is said to be 35 feet in depth, but is now full of water. It is said to have been sunk to the foot wall, cutting through 26 feet of quartz. The cross-section is 6 by 8 feet, and a collar extends for 18 feet down. The vein on the surface is exposed for only a few feet at the shaft, showing a width of five or six feet. A few hundred feet south another exposure for a distance of 30 or 40 feet occurs, where it is entirely in the granite, and has a width of from two to three feet. The quartz is similar to that of the previous property, with small remnants of greenstone scattered all through. Galena is quite plentiful, also copper and iron pyrites.

Harvey's first camp, a few miles south of Burnt island, was the first place reached. Two locations, BJ17 and 20, had been surveyed, and I was informed a couple of small test pits had been sunk, but I did not visit them.

John Sykes Syndicate.

My trip to the Minnetakie country was made in company with Messrs. Fulton B. Jewell and G. H. Fanning, who with Joe Greenwood were prospecting and testing properties during the past year in this district for the John Sykes syndicate of Glen Williams, Ontario. They had surveyed a number of locations on different parts of the lake, and had done considerable prospecting work on them. Most of these were visited and examined with more or less minuteness.

The first were locations SV106 and 107, aggregating a little over 80 acres, on Neepawa island. The formation is hornblende schist and trap, with eruptive granite in the interior. The ore

body is a porphyry dike three or four feet wide and traceable for at least a quarter of a mile, following the strike of the schist, which is northeast, and dipping nearly 90 degrees west. The island is pretty well timbered and moss-covered, rendering prospecting difficult. In fact all the country around this part is fairly well supplied with timber. An examination of the shore at another part of the island showed the rock to be altered felsite.

Location SV104, containing nearly 60 acres, and situated on a point about one mile south of Neepawa island, at the outlet of Twin lake,

was next examined. The formation is similar to the preceding, being hornblende schist and trap, with a strike nearly east and west. Following a foot trail for a distance of a few hundred feet from the shore we came to the vein, which appeared to be a contact from one and a-half to three feet in width and traceable for 70 or 80 feet, curving around the base of a small hummock consisting of porphyry, and extending into the schist, across the strike of same. A few shots had been put in and a few square yards of stripping done. The vein appeared to lie pretty flat. It consisted of white quartz with little or no concentrates.

A few miles further up Twin lake we came to SV105, on which the greatest amount of work had been done. The formation is hornblende schist, with a strike of north 20 degrees east. An ore body consisting of a mixture of quartz, schist and felsite, the whole possessing a schistose structure, and much altered on the surface, traverses the location with the strike of the schist. A seven by nine foot shaft was sunk on the hanging wall of the vein the previous winter, and although operations have been suspended for a while they will be resumed shortly. At the bottom a cross-cut has been driven 15 feet east. As the vein dips west the hanging wall is not exposed, but at least 16 feet of vein matter has been cross-cut, consisting of schist and quartz, about 25 per cent. being the latter, occurring in small lenticular masses and stringers. On the surface the vein has been stripped across in a couple of places about 150 yards south of the shaft. A couple of small felsite dikes full of quartz stringers were exposed, with considerable decomposed schist on both sides. A log cabin and a blacksmith shop have been built. I hear that a 10-stamp mill was being taken in here in January, 1899.

Ruby Island, or location SV103, was next visited, and proved to be an interesting property geologically. The island is roughly dumb-bell shaped, a low lying isthmus with a beautiful sand beach—a number of sand beaches occur at different points on the lake—on each side connects the two main portions, only one of which, containing 30 or 40 acres, was examined. It was thickly timbered and the rock deeply moss covered, but by following the shore around where the rock was exposed a fair idea of the nature of the formation could be obtained. An examination showed that the latter consisted of a series of parallel bands of different kinds of rock, conforming with the general strike of the country. The principal of these is a band of hard, light-colored schistose felsite, containing small stringers of quartz. This was about 70 feet in width, and crossed the main portion of the island. On each side of this was a siliceous green schist varying from coarse to fine grained, and next to this a coarse grained amphibolite, which

was exposed only on the west side. A small dike of coarse grained gabbro about eight inches in width in the green schist led to an examination of the main shore about two miles distant, where the formation proved to be gabbro.

Another is a property, SV107, was visited on the return trip. A dike of porphyry over 100 feet in width, with hornblende schist on each side, crosses the island. In some places the porphyry is full of quartz stringers, usually a few inches in width, and running without any regularity or persistency. Iron pyrites is plentiful, and it is said that copper pyrites and galena also have been found. Two or three shots have been put in.

The last places examined were SV109 and 110, aggregating 80 acres, on the long narrow peninsula extending northeast in the southwestern part of the lake.

The country rock is green schist and trap. A felsite dike 12 to 20 feet in width, containing small stringers of quartz, crosses both locations. A shot has been put in at one place. On SV110 a small parallel dike from one to three feet in width traverses the location south of the larger one. A little stripping and blasting work has been done on it. At one point a quartz vein 12 inches wide is exposed on one wall of the dike, where a shot had been put in and some stripping done.

One or two other parties were working at different places on the lake, but I did not think it necessary to visit any more properties during this trip, as nothing more than prospecting work was being done.

Locations in the New Klondike.

During the greater part of the year three or four properties in the New Klondike have been steadily worked and the place bids fair to become an important mining centre. A new flag station named Dymont, with a half mile of side-track, has been established on the Canadian Pacific Railway, where Bear creek crosses the track, a distance of 20 miles east of Wabigoon, and the town site of Dymont surveyed. Mr. D. A. Larson, who was in-

strumental in securing this station, has built a hotel there, with first-class accommodation, and this is now the most convenient point of entry to the mining country to the south. A wagon road nine miles in length leads to the New Klondike. This was originally cut out by Walker and Brown and others who are principally interested there, and the Government has widened and improved it for a distance of six miles. The country being comparatively level and the timber light, very fair roads can be cut at no great expense. The New Klondike is also reached from Wabigoon or Dinorwic by a steamer which runs up Little Wabigoon river to within three miles of the mines, and a road has been cut out in order to establish connection with the railway by this route. Other roads from place to place have been cut out where necessary by those operating in this section. Thomas Hogan, who has done most of the development work here by contract, has been very energetic in road cutting, having spent, he informed me, \$500 in this work.

Watson's Mine.

What is apparently one of the best properties in the New Klondike is HW416, a location of 40 acres, owned by the Hon. Robert Watson, Minister of Public Works for Manitoba, and John M. Monroe, of Dinorwic. Mention was made of this property in last year's report. On no property in this part of Ontario are finer surface showings evident. Whether the results of development work will fulfil the expectations of the owners is an interesting question to all who are operating in the vicinity. The formation is felsite and felspar porphyry. Fire has run over a considerable part of the location, which had been covered with a dense growth of small evergreens; and about 6½ acres have been cleared. Large masses of dark blue quartz outcrop irregularly on the higher ground where the rock is exposed, suggesting the likelihood of immense ore-bodies underneath. As the greater part of the location is either muskeggy or the rock soil covered, the work of stripping is expensive, necessitating the removal of considerable earth, loose rock, moss and trees, and although a great deal of this work has been

The New
Klondike
Country.

Location
HW416.

done, with very favorable results, there is still much to be learned from what is yet hidden under the surface covering. The largest outcropping of quartz is about 150 feet in length, with a jog of 20 feet near the centre. It ranges in width from one to 22 feet, averaging 10 or 15 feet. Being apparently more resistant to glacial action than the country rock, it stands out to a height of several feet. A trench 170 feet long, two to three feet wide and three to five feet deep, has been made along the south wall of the ore body, and near the south end an open cross-cut five to eight feet deep and 75 feet long has been made, cutting through 22 feet of quartz.

Another body of quartz three feet wide is cut by the cross-cut at a distance of fifty feet from the large body. Other outcrops occur to the south, on the strike of the large vein, but their connection with the latter has not yet been determined. Farther west bodies of quartz several feet in width have been uncovered for a short distance in three or four places. A costean six or seven feet deep and about 17 feet long has been made on a vein crossing from HW477 on the southern part of the location. The principal vein is traceable with a continuous outcropping for about 150 yards, varying in width from one to seven feet, and averaging about three feet. It has a strike of northeast and a dip of about 80 degrees east. About 250 feet of the vein has been stripped. At the northeast end a junction occurs with a large vein six or seven feet wide which comes in from the south, and is traceable for seventy or eighty feet with stripping for most of the distance. A six by eight foot shaft, dipping about 80 degrees east, has been sunk on the vein to a depth of 90 feet, and is being continued. The work is done by Thomas Hogan, who has contracted to sink 150 feet with 200 feet of drifting at the 100 foot level. The vein is not so strong in the shaft as on the surface, the variation in width being considerable. There is a comparatively large quantity of copper pyrites and zincblende present, along with the usual per cent. of iron pyrites and a little galena. The hoisting plant consists of a 10 h.p. hoister, a 9 h.p. upright boiler and 750 lb. ore buckets,

sliding on a skidway extending to the bottom of the shaft. A head frame 22 feet in height has been constructed. A suitable ladderway has been provided to within 30 feet of the bottom, the ladders below this being movable. The force consists of seven miners, working in day and night shifts. There are on the property a boarding camp, a hoisting engine house and a stable.

Northwestern Ontario Exploration Co.

A number of locations had been taken up by Walker and Brown, the first prospectors in the New Klondike. An offer Location HW 418. was made of any one of their locations to whoever would sink a 250 foot shaft upon it. This offer was taken by the Northwestern Ontario Exploration Company, with head office in London, England. Managing director of the company, J. Scott Smith, and superintendent of mines, S. F. Franco. HW418 was first chosen. What appeared to be the outcrop of an immense body of quartz 40 or 50 feet in width, forming a small hill, proved upon sinking a 12 foot test pit to be nothing more than the upper side of a flat lying vein two or three feet in thickness. This however dipped at an angle of 20 degrees into a bluff 70 or 80 feet away, and a shaft was sunk there to a depth of 78 feet, 34 feet vertically in the hanging wall, cutting the vein, and 44 feet on the incline. This shaft, I was informed, revealed three feet of pure quartz and about 12 feet of a mixture of quartz and greenstone. But as values were not satisfactory it was abandoned entirely, after being properly fenced to prevent accident.

The same company are now sinking on HW419, an adjoining location of 40 acres. Work was commenced under the Location HW419. previous agreement, but an absolute title to the property has since been acquired. A shaft seven by nine feet inside the timbers has been sunk to a depth of 142 feet, with sinking continued. It is sunk on a very small but extremely rich vein, from four to six inches in width on the surface and said to be traceable for 1000 feet. It has a strike of slightly north of west, and a dip of nearly 90 degrees west. The vein at a short distance down pinched out altogether,

leaving a mere seam which continued persistently for a distance of 30 feet, and gradually widened into a vein again, until at a depth of 74 feet it was five feet wide. It then pinched out suddenly and left no traces of a vein whatever. Sinking was continued through the barren rock to a depth of 97½ feet from the surface, when quartz again appeared. This proved to be the vein again, which continued very persistently and clearly defined, with a width of from three to 10 inches to the bottom. I have been told that since I last visited the place the vein has widened out to two feet at a short distance farther down. The quartz varies from white to blue at different depths. It is slightly mixed with country rock and heavily charged with copper pyrites, with a fair quantity of zincblende and pyrrhotite. Strange to say, iron pyrites is rare. Considerable visible gold has been found. This mineralization applies to the upper portion of the vein, before it disappeared at a depth of 75 or 80 feet. The lower portion differs in that the zincblende has entirely disappeared, none having been found since the vein appeared the second time. This and the slightly different appearance of the quartz along with other considerations would lead to the surmise that the two portions of the vein had very little connection. The country rock next to the vein is massive and dark colored, with a felsitic structure, and is perhaps felsite. There is not sufficient surface exposure of the rock to make the geological surroundings of the vein intelligible, but an examination of the shaft near the bottom shows the vein to be included in a dike of this hard felsitic rock three or four feet in width, with softer schistose rock on each side. The mouth of the shaft is at an elevation of about 100 feet above a small lake close by. It has been securely timbered for a depth of 100 feet, with a ladderway for the same distance, and instructions were left to continue the ladderway to the bottom. The hoisting plant consists of a 20 h.p. hoister, with a 12 h.p. upright boiler, a head frame 18 feet in height and a skidway for bucket extending to the bottom of the shaft, the first 70 feet being vertical. Blasting is done by electricity. A force of six miners is employed. The work is done by

Thomas Hogan, who has contracted to sink to 200 feet. The usual building accommodation, such as boarding camps, etc., is provided. Roads have been cut through, communicating with adjoining locations and with the railroad.

On the same location a tunnel has been driven 50 feet on a vein which outcrops down the face of a hill and is said to be traceable for 600 feet along the top of the same. The dip of the vein is 55 degrees. It varies from two inches to two feet in thickness. Although rich at the entrance the vein was poor in the tunnel, hence the abandonment of it.

On HW417 two test pits several feet in depth have been sunk 40 feet apart, on a vein of white quartz from two to seven feet in width.

Maw and Greening Syndicate.

Messrs. John Maw and S. O. Greening, of the B. Greening Wire Co., of Hamilton, Ont., have together secured a half interest in (and I believe have since secured a complete title to) five 40-acre locations, viz., HW455, 476, 477, 478 and 479, from C. W. Hale and Captain H. Lowry of the New Klondike. Two or three of these have been under development all summer with the following results:

On HW479 a four by seven foot shaft has been sunk to a depth of 40 feet on a small vein averaging two feet in width, and traceable for about 250 feet, with stripping for the greater part of the distance. It has a strike of north 60 degrees west and a dip of nearly 90 degrees north. The width of the vein in the shaft remains about the same as on the surface. The quartz is dark blue, well charged with copper and iron pyrites and pyrrhotite. The shaft is provided with a neat and substantial collar to a depth of 10 feet, and a ladderway 18 inches in width, securely boarded off from the hoisting compartment for a suitable depth. The work is done under the superintendence of C. W. Hale.

On HW477, which adjoins HW416, mentioned previously, a number of outcrops occur suggesting the possibility of definite and fair sized veins underneath. The country rock is felspar porphyry and fine grained diorite. Some of these outcroppings, which average about two feet in

Location
HW477.

width and range from three or four to 10 or 12 feet in length, are roughly arranged so as to represent the outcroppings of probably continuous veins, while other exposures are isolated or branch off irregularly, making the whole a complex puzzle. In one instance a test pit was commenced on a small exposure of quartz which proved, upon the results of a few shots, to be quite a large sized quartz body capped by two feet of porphyry. Considerable test pitting and stripping has been done with satisfactory results. The quartz with its mineralization is similar to that of adjoining properties. It would be superfluous to mention all the veins examined, as the foregoing is fairly well representative of this part of the country.

An interesting geological phenomenon was shown me by Captain Lowry on locations

HW456 and 457, where the con-
Contacts on
HW456 and
457. tacts occurred among biotite granite, felsite, and a dark colored

schistose rock of felsitic structure of an earlier age than the felsite. In fact the felsite was the latest of the three. Its contact with the granite was very sharply defined and quite interesting. Numerous small stringers of blue quartz occurred in the granite, and some in the felsite also.

Veins in Coarse Gabbro.

An occasion was taken advantage of to visit HW460, a location belonging to Thomas

Location
HW460 Hogan, which proved specially interesting on account of the formation, which was gabbro, of a rather coarse texture. Extending up the sloping face of a hill about 200 feet in height, several small veins were observed, ranging in width from several inches to two feet, and traceable for from 25 to 100 feet, and said to be found also on the other side of the hill. A little stripping and blasting had been done, but assay values were too low to warrant any great expenditure. The quartz is blue, with no visible concentrates. Inclusions of green schist were found associated with one of the veins. At another place on the location several hundred yards distant, a band of this schistose rock 10 to 15 feet in width extended through the gabbro, and contained some splashes of white quartz well charged with

pyrites. Some blasting had been done, but assays were low and work was discontinued.

Tabor Mine.

The Tabor mine was visited on November 2nd. This was reached by steamer, which

Location
SV258. ran from Wabigoon to a landing up

Little Wabigoon river, 25 miles from the railway. A foot trail of a mile in length led to the mine. The property consists of SV258, owned by James Tabor and James Stephenson of Wabigoon, and operated under bond by the Eastern Townships Mining and Development Company of Sherbrooke, Que. A small quartz vein averaging a foot or so in width and traceable for several hundred feet, has been sunk upon by a five by eight foot shaft to a depth of 50 feet, the shaft having an inclination of 80 degrees with the horizontal. The manager of the mine is H. B. Aylmer, and the foreman Thomas Armstrong.

Locations on Manitou Lake.

In the latter part of June I made a trip through the Manitou region and visited a couple of properties which were the only places under development at that time.

Westerfield Mine.

The first place visited was situated between the Upper and Lower Manitou lakes, near the narrows. The steamboat landing was connected with a small body of water named Charlton lake by a foot trail of about a mile in length; a canoe trip of about half a mile across Charlton lake completed the connection with the property. This consisted of

Locations
HP355, 386
and 387 and
G31. locations HP355, 386 and 387 and G31; containing 40 acres each.

Operations have been carried on by the Manitou Lake Gold Mining Company, Limited; the head office, St. Paul. President, F. M. Joslin; vice-president, Cyrus Wellington; secretary, F. E. Draper; general manager of the mine, N. C. Westerfield. The company own the first two locations and hold the last two under bond. Work has been going on since April 12. A force of seven miners was employed at the time of my visit, June 21. The formation consists of green schist. An irregular quartz vein two or 2½ feet in width, apparently breaking into

branches in one or two places, is traceable by several out-croppings for over 1000 feet. A band of schistose felsite about two feet in width is associated with the vein for a considerable part of its length.

Three shafts have been sunk ; the first, or No. 1, to a depth of 43 feet ; the second, or No. 2, at a distance of 180 feet from No. 1, 22½ feet, and the third or No. 3, at a farther distance of 700 feet, to a depth of 40 feet, with 20 feet of drifting in each direction at the bottom. The first two shafts were not in operation and were partially full of water at the time of my visit. No. 3 shaft is about a quarter of a mile from Charlton lake, to which a tramway could be conveniently constructed with a drop of 70 or 80 feet towards the water, if it were desired to build a mill. Mr. Westerfield gets very satisfactory assays from the quartz resulting from development work. All the quartz taken from the shafts is carefully sampled and assayed weekly on the premises.

Barker Mine.

I learned later on in the season that operations had been commenced on a property known as Barker Bros. mine on the southern part of the Lower Manitou lake. I did not visit the property, but Mr. Forbes, the business manager, informed me that a shaft had been sunk about 50 feet, with a considerable amount of stoping between the bottom and the surface. A 2-stamp Tremaine mill has been installed and has been in operation for some months.

Quackenbush Locations.

On my return trip to Wabigoon I visited HP375, a property under operation by Mr. V. Quackenbush. Two shafts have been sunk 50 feet and 66 feet respectively, (the former having 18 feet of cross-cutting at the bottom where the vein is very wide) on a small bedded vein of quartz in a green schist formation. These shafts were not in operation at the time of my visit ; the figures regarding depth, etc., having been obtained from Mr. Glass, the manager of the work. But sinking had been commenced on a felsite dike full of quartz stringers, which crosses from an adjoining location and has the appearance of a promising ore body.

Mines of the Lower Seine.

The region of the Lower Seine is developing well. It has two mines that are producing gold, and a number of properties are in course of development that in a short time, it is confidently hoped, will be equipped with mills of large capacity to treat their extensive ore bodies.

Golden Star Mine.

The Golden Star mine has made rapid progress since the commencement of operations.

The property, consisting of locations AL114 and 116, situated about 4½ miles north of Mine Centre, was originally owned by the Seine River and Rainy Lake Exploration Company, but has since been acquired by the Golden Star Mining and Exploration Company of Ontario, Limited. Head offices, Duluth, Minn., and Port Arthur, Ont. President, A. C. Hubbell ; vice-president, Thomas A. Merritt ; secretary-treasurer, A. E. McManus. Capitalization of the Company, \$1,000,000, in \$1 shares.

Development work has been advanced as fast as possible since the shaft was started.

The following are the underground measurements up to January 26th, 1899, the date of my last visit :

Depth of shaft, 376 feet. First level, depth, 74 feet ; north drift, 107½ feet ; south drift, 101 feet. Second level, depth 150 feet ; north drift, 149½ feet ; south drift, 120¾ feet. Third level, depth, 225 feet ; north drift, 150 feet ; south drift, 25 feet. Fourth level, depth, 300 feet ; north drift, 113½ feet ; south drift, 22½ feet. Height of drifts, seven feet ; width, four to 15 feet. Winzes and upraises : 100 feet north of the shaft is a winze between first and second levels ; 80 feet north of shaft, winze between second and third levels ; 110 feet north of shaft, in third level, winze 30 feet deep ; 60 feet from shaft, in second level south, upraise 57 feet above floor of drift. Stopping : First level south, length 40 feet ; height above floor, 70 feet ; width, three to seven feet. Second level, north, length, 30 feet ; height, 31 feet. Third level, north, overhand stoping commenced at

winze.¹ The ore is shot down on a row of stulls placed under the stopes along the roof of drifts, and sent through mill holes to cars below.

A No. 7 Cameron pump is employed for draining the mine. A six-drill Rand compound air-compressor has been installed, with four Little Giant drills in operation. Three thousand feet of five-inch conductor pipe extends from the shaft to the mill where the compressor is situated, with four-inch pipe down the shaft. Two receivers, 10 feet in length by 30 inches in diameter, are in use. Tramways are laid in all working drifts, with tramcars in first and second levels. Hoisting has hitherto been done by bucket, but a skipway was in

course of construction at the time of my last visit, having been completed and in operation to the second level. A 2,000 pound steel skip has been installed, with steel railway and suitable back stringers to prevent the skip from leaving the rails. A self-dumping arrangement is provided at the surface, with chute. The hoister is a duplex with 8½ by 12-inch cylinder and 42-inch drum, made by M. C. Bullock of Chicago. A 65 h. p. boiler furnishes steam. A 40 light dynamo has been installed at the mine, with incandescent lights at the loading stations underground as well as on the surface. An Otto aerial tramway, 2,700 feet in length, conveys the ore from the shaft to the mill. The discharge terminal is 10 feet lower than the loading

NOTE ON THE GOLDEN STAR MINE. July 18, 1898.

Apart from the fact that it is producing the largest amount of gold in the Seine River district, the Golden Star, like the Sultana, is interesting as an ore deposit. This is in a measure due to its situation.

As is well known, a mass of that variety of granite commonly known as protogine has forced its way to the present surface through the green Huronian rocks between Shoal and Bad Vermilion lakes, and in this intrusive material are found at a number of points well defined fissure veins, and more rarely small bodies of auriferous felsite. Deposits of the former class were being worked at the Foley, Ferguson, AD2, Lucky Con and Emperor mines, while an opening on the felsitic material may be seen at the vein close to the mill on the Ferguson property.

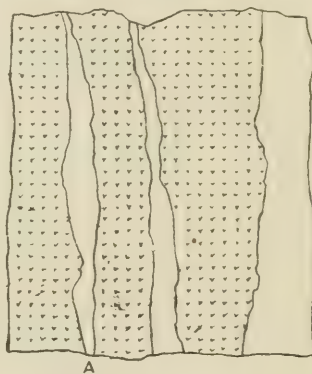
At the Golden Star, however, there is a change. Instead of lying wholly within, the mine is situated in Huronian rocks to the north of the area of granite, distant only a few hundred yards from the edge. The shaft has been sunk on a broad ledge on the face of a hill, which to the south slopes gently up to a height of about 100 feet, and on the north descends a short distance to a small ravine.

Starting from the shaft to walk in a southerly direction, a shallow pit is met with almost immediately; in the walls and bottom can be seen portions of a dike of yellowish-green felsite, with streaks of quartz. There is an opportunity afforded here of examining both horizontal and vertical sections of these quartz bodies; they are distinctly lenticular in form, and are irregularly distributed through the felsite. This is shown in the accompanying sketch.

The horizontal section as seen in the bottom of the body marked A is an almost symmetrical lense in shape, terminating sharply at one end.

Proceeding southwards up the hill, the dike may be traced for some distance with an average width of 10 to 12 feet; time did not permit a further examination in this direction. North of the shaft it could not be traced for debris, and plunging into the little ravine it is lost beneath heavy soil.

From a surface examination it was seen that no definite continuous vein was traceable, but that parallel lenticular bodies of quartz traversed the



A



FELSITE

QUARTZ

Scale—1 inch=2 feet.

Face of south side of pit just south of shaft.

dike somewhat irregularly. It was impossible to determine, on account of the soil, whether these were branches from one vein or separate masses arranged along parallel lines of fissure, and indeed it matters little to the working of the mine which of these ideas is correct, although the inclination is to give preference to the latter. Some further evidence may be gathered from the underground workings.

The shaft at this time had reached a depth of 290 feet, and three levels had been run at intervals of about 80 feet.

The first level north showed a fair amount of quartz in the dike near the shaft; as the breast was approached the felsite diminished in quantity and finally disappeared, while a 10 inch vein of quartz continued its course through the greenstone

terminal, which difference of elevation, owing to the ups and downs of the cable way, is not sufficient to admit of transportation by gravity, an additional four horse-power, applied at the mill, being required for the purpose. No curves are necessitated. The carrier cable for loaded buckets is $1\frac{1}{8}$ -inch in diameter, and for empties $\frac{7}{8}$ -inch; the traction cable is $\frac{5}{8}$ -inch in diameter, and has a speed of four feet per second. Fifteen standards, constructed of six by six inch timbers and situated at various distances apart, support the cables. Nine steel buckets of 600-lb capacity each are in use, with three in reserve.

A stamp mill has been erected on Bad Vermilion lake at a distance of half a mile from the mine. It is situated on JO41, Stamp mill on Bad Vermilion lake—a location adjoining the Golden Star property and belonging to the JO41 Gold Mining Company, with the surface rights leased to the Golden Star Company.

country rock. Driving had been discontinued when this latter was reached on account of the poverty of the ore. In the south portion of the same level the felsite was present in large quantity and no greenstone was visible. The quartz as seen in the roof commenced at the shaft with a width of two feet, which rapidly increased to eight feet in a few yards. There was here a large body of ore, eight feet broad and 15 feet long; after this was passed the quartz shrank very much in size, and at a distance of about 40 feet from the entrance separated into two divergent branches, six inches and 10 inches wide respectively. At this point work had ceased.

On the second level north, a niche had been cut for a pump in the east wall a few feet from the shaft. In the face of this enlargement could be seen an irregular body of quartz, 14 feet across, but cut down suddenly by a mass of felsite to about half the width. Because of the irregularity, it was impossible to judge the size of this body of ore with any accuracy; it probably extended upwards for a fair distance, while maintaining its width, and this would imply a mass of considerable size. As in the level above, the felsite thinned out gradually as the face was approached, leaving only the quartz to traverse the greenstone. In the roof of this could be seen some typical lenses of quartz; they are represented roughly in the sketch.



The third level south had been driven 25 feet in felsite with an average exposure of quartz 10 inches in width; the latter had at this point some of the features of a continuous vein.

The mill has an excellent site on bare rock which has a convenient slope towards the water, of which there is a suitable depth. The building is substantially and neatly constructed of material supplied by a saw mill on the property. The following are the dimensions: Battery room, 37 feet 5 inches by 43 feet 8 inches; vanner room, 37 feet 5 inches by 40 feet 8 inches; engine and compressor room, 37 feet 6 inches by 36 feet; boiler room, 30 feet by 40 feet. The machinery consists of the following: Comet D crusher—the buckets dump directly into the crusher without intermediation of grizzly—100-ton ore bin, two Challenge ore feeders, two batteries of five stamps each, two Browne's two-compartment hydrometric sizers and four Frue vanners with six-foot smooth belts. The machinery is all from Fraser & Chalmers. Power is supplied by the following: A 12 by 36-inch Fraser & Chalmers Corliss engine, with 96

In the north drift felsite can be seen all along the walls, although the width is not more than six feet as shown by a cross-cut near the breast 70 feet from the shaft. The quartz as usual varies in amount; there is a fair quantity near the entrance, but only four inches at the breast.

At the bottom of the shaft three feet of quartz can be seen on the hanging wall, and this extends for some distance up; the appearance of this portion of the deposit was very encouraging.

It is impossible to give any information as to the value of the different portions of the lode; but no better evidence could be desired than that offered by the treatment of the ore on a large scale. The results of the mill tests are too well known to require quotation. I was informed by Mr. Merritt, at that time superintendent, that the felsite carried sufficient gold to rank as a low grade ore, and although I had no definite information as to the tenor of the quartz, it is probable that the values are fairly large. If the felsite is as rich as was stated, the amount of deadwork in the mine will be small, and the lenses of quartz will represent bonanzas instead of constituting the ore necessary for the economical operation of the mine.

From its physical characteristics it is more than probable that the felsite extends in the form of a dike to a considerable depth, and with this encouraging hope it might be possible to tide over any season of poverty during the exploitation of the lode.

A good deal of work has been done since these notes were made however, and the deposit has doubtless been explored with some thoroughness. At that time there was abundant promise of a prosperous future in ore reserves which had been blocked out, and in the appearance of the ore body in the shaft and lowest level. Unless some radical change has taken place there is no reason for resigning this hopeful view of affairs, which would place the Golden Star among the foremost of our mines in Western Ontario.

J. WATSON BAIN.

revolutions per minute, a Fraser & Chalmers return tubular 80 h.p. boiler and a Rand Drill Co. boiler of the same type and power. The mill is lighted by a 60-light dynamo, driven by a 16 h.p. engine. The mill has been in operation since November 9, 1898. The machinery is well constructed and substantial, and works very satisfactorily.

The foundation of the batteries was prepared by excavating in the solid rock to a depth of four feet, filling with concrete carried to a height of four feet above the surface, making a depth of eight feet of concrete altogether. On this are placed the solid cast iron anvil mortar blocks, 30 inches in height and weighing 14,000 lb each. The mortars, which weigh 6,300 lb each, are placed on these.

The following details of mill practice, etc., will be interesting: Number of stamps, 10; weight of each, 1,020 lb; capacity of mill, variable, average 35 tons per 24 hours (although 41 tons

Mill Practice.

have been crushed in that time); height of drop, six to seven inches; speed, 97 drops per minute; material of shoes and dies, forged steel; cams (Blanton), tap-pets and heads, cast steel; depth of discharge, five inches when dies are new, not maintained constant; screens, diagonal slot, 40 mesh; no inside amalgamation; apron plates, 12 feet long by 54 inches wide; double with $1\frac{1}{2}$ -inch drop in centre; slope, $1\frac{1}{8}$ -inch per foot. The amount of mercury added to the batteries varies with the quality of the ore. About five gallons of water per minute are used to each battery. Plates are dressed every three hours. There is about one per cent. of concentrates, which assay very high—from \$150 to \$200 per ton.

A dock has been constructed close to the mill, and a small steamer owned by the company runs on Bad Vermilion lake between the mine and the portage on the small river which empties into the Seine.

There are about 25 buildings on the property, including mill building, tramway terminals, shaft-house, dry, blacksmith shop, hoisting engine house, office, assay office, powder magazine, stables, boarding camps, a number of private dwellings and a saw mill: the latter has a capacity of 10,000 feet per day.

There is a total force of 35 on an average; of these 16 are miners and six are employed in the mill. The general superintendent is Robert A. Kerr, and the engineer C. J. Stone.

The mill machinery is all in a satisfactory condition. The ventilation and drainage of

Condition of the Works.

the mine is satisfactory. A man-way has been constructed to the required depth, with ladders and platform provided, but not well arranged in some places. The bucketway is properly fenced at the shaft-mouth. The following recommendations, etc., have been left in the Inspector's Book on the occasion of my last visit: 1. Attention is directed to the requisition regarding signal code in previous entry. 2. Several rungs in the ladderway were found weak and broken; more care should be taken to prevent this state of affairs. 3. Below the fourth level arrange the ladderway so that the man-hole will be on the foot wall side of the platform, and the foot of the ladder on the hanging wall side. 4. Provide a suitable guard rail around the skipway at the second level and at all others below. 5. Scale carefully the walls in stopes, as they (the hanging particularly) are not very sound. 6. The stulls in some cases are not well placed, considering the softness of the hanging wall; they should be set at an angle between the normal and the vertical. 7. Do not allow riding on the aerial tramway. Inspector DeKalb left instructions which will be found in his report.

A fatal accident occurred in the shaft on October 28, 1898, and a special report on the same was made to the Bureau.

Olive Mine.

Development work has been steadily progressing at the Olive mine, with installation of new milling and mining machinery. This property originally belonged to the Preston Gold Mining Company of Ontario, Limited, but as this corporation was formed for exploration and development purposes only, a subsidiary company, the Olive Gold Company of Seine River, Limited, was formed to take over the mine after a certain stage of development work had been reached. The officers of the

Organization of the Company.

latter company are as follows: President, Hon George E. Foster; vice-president, William Blackwood; secretary, C. B. Deacon, Winnipeg, Man. The company is capitalized at \$1 000,000 in \$1 shares. W. A. Preston is superintendent of mines; address, Olive Mine, Mine Centre, Ontario. A. E. Doidge is mine captain and engineer. A variable force has been employed throughout the year, averaging about 35.

Mining operations have been almost exclusively confined to the main shaft; a little test pitting, etc., having been done at other points on the property. On G60 a test pit has been sunk 25 feet on what was believed to be an extension of the main vein, but is discontinued and properly fenced. The following were the underground measurements in the main shaft on the date of my last visit, January 25, 1899: Depth of shaft, 223 feet. First level, depth, 60 feet; east drift, 70 feet; west drift, 127 feet; cross-section, 4 by 6 feet. Second level, depth, 125 feet; east drift, 90 feet; west drift, 19 feet; cross-section 5 by 6½ feet; air shaft, 60 feet east of main shaft, and connected by drift with the latter; depth, 60 feet. Stoping: In the first level east, all ore is stoped out overhead between main and air shafts, leaving a shaft pillar from 10 to 25 feet in length at the main shaft, extending from the first level to a height of 36 feet, with filling of broken ore above, and five by five feet shaft pillar at the air shaft near surface, with broken ore filling each side of the shaft supported by stulls and lagging extending up each side and along the roof of the drift. Stoping east of air shaft: Length, 42 feet; average height, about 18 feet; width of total stoped out space east of main shaft, about three feet. In west drift: Length of stope, 31 feet; average raise above drift, 4½ feet, and width, 2½ feet.

East of the shaft at the second level a pump chamber has been excavated in the foot wall and a cistern sunk, a No. 7 Cameron pump being employed for drainage.

A ladderway has been constructed to the second level, with temporary ladders below. A six-drill Rand air compressor has been installed with five No. 2 drills in use, and two receivers 10 feet in length by 30 inches dia-

meter. The shaft had been vertical for the first 12 feet of depth, but has been recently straightened to correspond with the inclination of the remaining portion. The shaft house has been moved accordingly.

No important change has been made in the hoisting machinery, which consists of a small steam hoist and bucket with ⅜-inch wire cable. The shaft house has been partially boarded in and chutes constructed for dumping ore and waste rock separately.

The old two-stamp battery has been supplanted by a larger one, and other additions made to the milling machinery, which was expected to be in operation early in February. The new machinery consists of the following: Two batteries of five stamps each, with 10-foot apron plates, two Challenge ore feeders, a three-compartment hydraulic classifier, two extra six-foot smooth belt Frue vanners—there being already one in use—and a Comet crusher. All the machinery is from Fraser & Chalmers. There are also two new 45 h.p. locomotive style boilers, connected with the old boiler, and a 35 h.p. engine, with pumps, tank, heater, etc. The old building is used, with an addition to the vanner room of 16 by 20 feet, and a new boiler room addition of 30 by 40 feet.

The following buildings are on the property: Mill building, shaft house, hoisting engine house, dry, blacksmith shop, assay office, office, store house, stables, general dining and sleeping camps and private dwellings.

Before the compressor was installed the work had been suspended altogether below the first level during part of the summer, owing to the poor ventilation, but the compressed air removed this difficulty. B. shaft and the new test pit have been properly fenced. The main shaft is provided with suitable guard rail with the exception of on the north side, where a chain is employed. Instructions were left to have a rail substituted for the chain. Convenient loading stations have been provided at both levels; the excavation in the hanging wall furnishing a safe passage way from one drift to another. The following recommendations, etc., were left in the Inspector's Book on the

occasion of my last visit : 1. The man-holes in the first two platforms of the manway should be reduced in size. 2. A shield should be provided over the ladderway at the first level to prevent material falling down the shaft from entering the man-hole there. 3. Keep ice cut away at the first level, and also keep ladder rungs clear of ice. 4. The ladders below the second level are not safely hung ; they should be made more secure.

Alice A. Mine.

The Alice A. property consists of K191, a location of 80 acres. It is reached by a $3\frac{1}{2}$ -mile foot trail from Wild Potatoe lake. But perhaps the most convenient means of access is by way of Little Turtle river, to the mouth of which a Government road extends from Mine Centre ; a voyage of eight or nine miles up the river and a trail of three-quarters of a mile complete the route to the mine. It may also of course be reached from the Olive mine, which is on Little Turtle lake. A winter road 10 miles in length connects the mine with Mine Centre. The owners are the American and Canadian Gold Mining Company, with head office at West Superior, Wis. President, J. S. Hillyer, West Superior ; vice-president, George H. Hillyer, West Superior ; secretary, J. M. Gray, Duluth, Minn. The manager of the mine is George L. Robbins, and the foreman, T. G. Prideaux.

At the time of my visit, July 26th, there was a force of nine men, including three miners. The formation has been described in previous reports, and a repetition is not necessary. The latest developments appear to show that the country rock for a width of hundreds of feet carries gold in paying quantities, and that it is therefore a large, low grade proposition. But, like the Hammond Reef, it will doubtless be some time before an estimate of its value can be safely ventured.

Near the centre of the location two shafts have been sunk 300 feet apart on a slightly elevated area of bare rock, and a number of small test pits two or three feet in depth have been sunk at different points for test

purposes. One of the shafts is 35 feet deep, but full of water. An open cross-cut 18 feet deep has been made north from the shaft, cutting altogether, including the shaft, 35 feet of the ore body. It is intended that open mining shall commence at this cross-cut by working westward, removing the ore in slices or benches as in underhand stoping. The other shaft has been sunk 70 feet, and sinking discontinued for the present, with the intention of resuming again in the winter. At a depth of 60 feet a 5-by 7-foot cross-cut has been driven north 12 feet, and will be continued to about 200 feet, all this underground work being for test purposes only. A suitable ladderway has been constructed in the shaft, but it is not properly divided off from the hoisting compartment. The necessity of having this done was pointed out. Hoisting is done by horse and bucket. The bucketway is properly fenced at the surface. A stove on the surface, with pipe extending down the shaft, is employed for ventilation purposes.

A mill run of 10 tons from the dumps of both shafts gave \$11.38 per ton ; the milling being done at the Olive mill in February, 1898. Mr. Hillyer, the president, informed me in January, 1899, that a two-stamp Tremaine mill had been installed on the property, and that very satisfactory results have been obtained so far. A 50-stamp mill is in contemplation.

There are seven neatly constructed buildings on the property, including office, boarding camp, blacksmith shop, etc.

Independence Mine.

The Independence mine, situated near Sturgeon Falls on Seine river, was visited twice ; on July 26 and on September 13, 1898. The property consists of the south half of lot 11 in the third and fractional parts of lots 11 and 12 in the second concession, township of Bennett, aggregating 613 acres. It is owned by the Independence Mining and Development Company, Limited ; head office, Sparta, Wis., U. S. A. ; President, T. O. Thorbus ; secretary-treasurer, H. M. Newton. The following is the route from Mine Centre : A steamboat voyage of 15 miles up Seine

The Property and its Development.

Mill run of the Ore.

Independence Mining and Development Co.

river to a landing about a quarter of a mile below Sturgeon Falls on the north side of the river, a three-mile Government road to Cedar lake (giving a view of the mill on the opposite side) and a voyage of about three-quarters of a mile across the lake. The above company have been carrying on work on the property since September, 1896. A variable force averaging probably eight or ten, including miners and mill men, have been employed during the past year, with Mr. A. N. Rice as manager.

The formation consists mainly of sericite and felsite schists, similar to that of the Olive or of the Alice A. The two latter and this mine are all three situated in almost a straight line on a narrow belt of felsite and sericite schists which are shown on the Dominion geological map as continuous, extending for over 20 miles with a strike of about east and west. At the Olive mine, the most westerly of the three, the formation is sericite schist. The best ore consists of small but persistent bedded veins of quartz from a few inches to two or three feet in width extending through the schists, and carrying exceptionally high gold values. A certain amount of the country rock adjacent to the quartz carries sufficient quantities of free milling gold to pay for mining and milling, about \$7 per ton being obtained on an average from this kind of ore. And it might prove when more has been learned of the matter that a larger quantity than is expected of the country rock carries remunerative quantities of gold, possibly sufficient to bring it into the category of large low grade propositions, aside from the existence of the small high grade bodies of ore which it contains. The Alice A, which is situated about centrally between the Olive and the Independence, is claimed by the owners to be a large low grade proposition hundreds of feet in width. The formation, or ore, is felsite schist, closely resembling that of the Olive; and like the latter it contains small bedded stringers of high grade quartz, which, however, instead of forming continuous bodies as in the case of the Olive, exists as numerous small independent lenses or kidneys scattered more or less throughout the schists, not in any case large

enough or sufficiently segregated to be workable independently of the schist. The Independence mine, which is situated about 20 miles east of the Olive, on this belt of schists, contains small but very rich pay streaks of quartz, similar to those of the latter mine, although apparently not so persistent. A test of an average sample of the country rock or schist taken over a limited area adjacent to but outside of the pay streak gave \$7.35 per ton. Of course it is hardly to be expected that any great quantity of the schist would average so high as this, but not sufficient is known about the matter to admit of any statement concerning it being very reliable. An examination and comparison of the three properties nevertheless gives a forcible impression of the resemblance among them in the respects mentioned, and the question is suggested: If one proves to be a large body of low grade ore, why not all three? And also, Why not any number or all of the properties between, situated on the same body of schists, if they are continuous, as the geological map indicates?

The main workings of the mine are on lot 11 on the third concession, where a shaft six Workings by eight feet in cross-section has of the Mine. been sunk 75 feet. As this was only for prospecting purposes, it will likely be abandoned and a working shaft sunk at a more convenient point close by on the strike of the same pay streak. The latter, on which the shaft is sunk, is a body of quartz heavily mineralized with copper and iron pyrites, from six to 24 inches in width and traceable for 50 or 60 feet on the surface. The vein dipped south, leaving the shaft at a depth of a few feet, but the latter was continued vertical. As the lower workings were full of water I could not go down, but the manager informed me that at a depth of 45 feet a cross-cut had been driven 10 feet south cutting the vein, and a drift had been driven 20 feet upon it. A cross-cut had also been driven three feet north from the shaft, making, with the width of the shaft, 19 feet of cross-cutting altogether. An average sample taken along this, excluding the pay streak, gave \$7.35 per ton. The pay streak averages \$145. A mill run of the dump, consisting of the material from the cross-cuts, including the pay

streak, gave \$19.42 per ton. A couple of test pits had been sunk near the shaft, one 15 feet and the other six feet. About 40 feet of open-cutting four or five feet in depth had been done along the outcropping of the vein east of the shaft.

The main shaft is provided with a collar 12 feet deep. A ladderway has been constructed to the first level, but is not in a safe condition. Instructions were left to have it remedied if work is continued there. For ventilation a centrifugal pump was converted into a blower by the addition of a number of blades. It was operated by man power, and an iron pipe conducted the air down the shaft. It was said to work very satisfactorily, clearing the shaft in five minutes after blasting. The hoisting machinery consists of a bucket and wire rope, with rough bead frame. Power is supplied by a horse.

A pole road slightly over a mile in length extends from the shaft to the mill on Cedar lake. The shaft is about 40 feet above the lake, admitting of gravity transportation of ore if necessary, as the grade is all downward towards the mill. One two-ton tramcar is employed, drawn by a horse.

On the south side of the property on the shore of Cedar lake a tunnel has been driven 16 feet north, cross-cutting a very siliceous altered schist, but the assays were low.

The mill, which was put into operation on April 1, 1898, consists of the following:

One five-stamp battery, a Challenge ore feeder, a Gates vanner after the Stamp Mill. Frue pattern with six-foot plane belt, rotary mill pump, 20 horse power horizontal boiler and a 15 horse power engine. The milling machinery is from the Gates Iron Works of Chicago. The stamps weigh 850 pounds each, and drop seven inches, at a rate of 95 drops per minute. The shoes and dies are of forged steel. Inside front and back and apron plates are employed. The sieve is 40 mesh, diagonal slot.

The buildings on the property consist of a mill building, blacksmith shop and boarding camps.

Decca Mine.

The property of the Decca mine consists of K222, a location of 40 acres, situated about

three miles north of Mine Centre. It is owned by the Decca Mining Company of Montreal, Limited. Capitalization, \$950,000 in \$1 shares; head office, Montreal. President, Wm. F. Borland; vice-president, C. C. Corneille; secretary-treasurer, Bannell Sawyer. The manager of the mine is F. C. Fisk. A force of from six to eight miners, along with miscellaneous employees, have been at work since June 15, 1898.

The formation is protogine. A number of quartz veins of variable width cross the location. Development work is in progress on two veins, or more strictly speaking, on two branches of the same vein, although nearly on the same line of strike. These veins range from a few inches to six or seven feet in width, and like all the veins in the protogine area are true fissures, and quite persistent as regards continuity. Two shafts have been sunk about 1,200 feet apart on these veins. No. 1 shaft, which is six by eight feet in size, has been put down to a depth of 55 feet, and No. 2 shaft, of the same cross-section, to a depth of 105 feet. In No. 1 a neat collar has been provided 14 feet deep, with suitable guard rail and trap door. A neat head frame has also been constructed. This shaft was full of water at the time of my last visit, Jan. 26, work being in progress in No. 2 only; but it was to have been opened again within a few days. The vein is two or three feet in width at the surface. Drifting has been commenced in No. 2 shaft at a depth of 100 feet. A collar 23 feet deep is provided. The vein ranges from five to seven feet in width in this shaft, and is practically vertical. Hoisting is done by horse power with single pulley block, sheave and hemp rope. Blasting is done by electricity.

The buildings consist of an office, blacksmith shop, boarding camps and shaft house at No. 2.

On January 26, 1899, I visited K231, known as the Bush Winning Property, which adjoins the Decca. Four miners were working by contract, sinking a shaft on a wide quartz vein in the protogine. A depth of 27 feet had been reached, the contract being for 100 feet.

Emperor Mine.

About three miles north of Mine Centre is situated the Emperor mine, consisting of location 656P, containing 37 acres.

Location 656P. It is owned and operated by the Standard Gold Mining and Development Company of Minneapolis. President, John Watson; secretary and manager of mine, James C. Beebe. This is also one of the numerous locations on the protogine area. A number of small quartz stringers and veins of variable width extend with more or less continuity across the property, with a general strike of northeast and southwest. One of these having a width of about six inches, and traceable for about a quarter of a mile, was under development during the summer. A six by eight foot shaft has been sunk on the vein (which is vertical) to a depth of 125½ feet. At a depth of 75 feet a drift has been driven northwest 29 feet, and one southeast 43 feet. At a distance of 16½ feet from the shaft in the southeast drift a cross-cut has been driven 41 feet southwest to cut a large parallel vein which outcrops in a gully close to the main vein.

A suitable manway, with ladders and platforms properly arranged, has been constructed to the first level, with suitable Condition of the Shaft. division between it and the hoisting compartment. A substantial platform has been provided at the level, and had been effectively protected during blasting by the hanging of "bumpers" underneath. The mouth of the shaft is properly fenced. Smoke and gases are effectively cleared out after blasting by an aspirator, with metal piping six inches in diameter extending down the shaft, and up beyond the surface for a distance of about 10 feet. A jet of live steam turned upwards inside of this, a few feet from the top, creates a powerful suction which clears the shaft in a few minutes.

The hoisting machinery consists of a new duplex 15 h.p. hoist with 18-inch drum and ½-inch steel wire cable, and a 30 h.p. upright boiler. A head frame and an engine house have been built.

Machinery, Buildings and Employees. The other buildings consist of boarding camps, blacksmith shop, manager's dwelling and office, including assay office. The force, at the time of my first visit, July 18, consisted

of 21 men, including 16 miners. Work had been going on since January 1, 1898. When there on the following January I found that the mine had closed down.

Foley Mine.

I visited the Foley mine on July 20 and found that it had been closed down since May 20, preceding. Extent of the Workings. Mr. W. M. Strong, the manager, who was still staying at the mine, informed me that a deal had been pending for the transfer of the property. He also gave me the following information on the underground work up to date: Depth of shaft, 420 feet; fourth level, north drift, 160 feet; south drift, 30 feet. Fifth level, depth, 400 feet, north drift, 72 feet, south drift, 28 feet. All ore had been stoped out between the third and fourth levels. No. 5 shaft, which when pumped out measured only 95 feet instead of 113½ feet as reported, had been sunk to 101 feet. On the west vein a test pit had been sunk 10 feet. Mr. O. B. Robinson is now in charge of the property.

Ontario Gold Concessions.

While in the Lower Seine river country in the latter part of July, I took advantage of an opportunity to visit Block A of the property of the Ontario Gold Concessions, Limited, of London, England, situated north of Red Gut bay, a northerly extension of Rainy lake. The nearest point from Fort Frances is 35 miles. The trip was made from the latter place in a small steamer, the Jenny Lind, with 40 feet keel and eight feet beam, purchased by the company for operations on this block. I arrived there on July 22 and spent a day and a half travelling by steamer and canoe and on foot over the concession, examining most points of interest and acquiring thereby a fairly good idea of the nature of the country included therein.

Exploration of Block A.

Before describing the geology or mentioning the "ore bodies" of Block A, a description of the Topographical features of Block A. topographical features will be given, along with an account of the method employed in prospecting, in order that an idea may be obtained of the difficulties to be encountered and the amount of work to be done

in exploring such huge areas in this country.

The total area of this block of the concession is 40,000 acres. Of this water covers 7,000 acres, swamp or muskeg, 7,000, and soil (making it unavailable for prospecting) 17,000, leaving only 9,000 acres of prospecting ground. These figures were obtained from Mr. Sullivan's report to his Company. The prospecting ground is scattered in irregular areas over the concession, so that the work of prospecting involves much more travelling than the mere covering of the available ground. The concession is nearly all forest-covered, which adds considerably to the difficulties of the work.

Between fifteen and twenty thousand acres have been surveyed into lots of various sizes, according to the character of the country and the closeness with which it deserves investigation, the smallest lots being 10 chains square. Niven's sixth meridian and south base lines are employed as reference lines, every corner post of each lot being marked with reference to both of these, so that by following any survey line to a post the exact position on the property can be found. The cutting out of the lines furnishes well defined boundaries, which allow of operations being confined to one or more lots, so that these may be prospected as much as desired. Topographical and geological notes are taken by the chainmen as they proceed. A contour of the shore of the whole block has also been made. The surveyors are followed by the prospectors, each block being allotted to three or more of the latter, as the case may be. They cross each lot backward and forward, walking abreast 30 feet apart until the whole has been covered. When a discovery is made all hands stop to strip and examine it. It is reported to the manager in the evening, who decides, after examination, what work shall be done in the way of test-pitting, stripping, etc. Samples are taken and tested for gold, and further samples are sent periodically to Rat Portage for assaying. So far there have been discovered and tested 26 veins and deposits in various parts of the block. Numerous test-pits have been sunk, ranging from three or four to 20 or 25 feet in depth. It was intended to test a couple of deposits with the

diamond drill, but I understand this idea has been given up. The instructions from the Company were, however, to go ahead until the whole block was prospected. The camp, which is all of canvas, consisting of a number of tents, is moved periodically to the centre of operations. A force of 25 prospectors, etc., are employed continuously. Monthly expenses range from \$2,500 to \$3,000. Mr. Alan Sullivan is manager, or "The Chief," as he is called, of this block, and Mr. J. D. Shields assistant manager. Work was commenced on July 26, 1897, suspended for the winter on October 19, resumed again on May 9, 1898, and discontinued altogether in October. A reward in proportion to the assay value of the find was offered as an inducement, but after all it was discouraging work, as it must have been patent to the men, at least after the first season's work was completed, that the chances of making a valuable discovery were slight.

The following is an account of my observations during the short stay I made on the property, Mr. Sullivan having kindly placed his time at my disposal, taking me to all important

Details of
the Pros-
pecting.

points of interest: The first trip was made by steamer to the north end of Porter inlet. Walking inland along a road for about half a mile over moss and tree-covered ground, with very little rock exposure, we came to a formation, probably several hundred feet in width, of a dark colored gneiss (doubtless crystallized green schist of the Keewatin series) associated with eruptive granite. This same species of dark colored crystalline schist is found on other parts of the concession and is the only rock which in any respect resembles, or corresponds to, the Keewatin or Huronian schists of other parts of the district. The association of granite is also characteristic, and, as I afterwards found, the rocks, etc., encountered on this short trip proved to be fairly representative of the entire block. The schists appear to be all in very intimate association with the eruptive granite which, with Laurentian granite, covers by far the greater portion of the block. Felsite dikes are very common in the schist, and the latter in many places is much contorted, showing beautiful folding on a small

scale. Another marked feature is the dip of the schists; almost wherever found in other parts of the district this is nearly vertical, never varying more than a few degrees, but here the dip is about 30 degrees.

The idea suggested by a consideration of the above facts is that the schists in this portion of the district are possibly the lower or synclinal portions of the folds which are represented by the middle or nearly vertical portions in other parts, all the upper portion having been removed by glacial ice, according to Lawson's theory. The dip and the much greater degree of crystallization would favor this hypothesis. It is a peculiar fact that very little gold has been found in any of the numerous deposits examined in the block. This fact, in conjunction with the preceding hypothesis, would suggest a probable limit to the depth of our gold-bearing deposits. Of course, as these folds are thousands of feet in height, there would be considerable range in depth for underground operations between the central or nearly vertical outcropping of the schists and the lower portion of the folds. However the above is nothing more than a mere suggestion, as time allowed only a comparatively limited examination of the block.

There is considerable variation in the character of the granite in different parts of the concession; much of it is Laurentian of a coarse porphyritic nature, and much of a later age, probably Huronian. Various kinds of dikes are found, felsite and pegmatite being common. In some of the latter the quartz and the felspar were each crystallized out into masses of over a square foot in area. North of Porter inlet a deposit of graphite was found of unknown extent, but probably too small to be of any commercial value. I saw a few pieces, some five or six pounds in weight, which must have been 60 or 70 per cent. graphite.

But the objects of vital interest to the operators were the gold deposits, if such they

may be called, considering how little gold has been found in them.

I visited a number of these, including all that were considered of any possible value. The first visited was north of Porter inlet. It consisted of a large body of nearly solid quartz, over 30 feet wide at one point, but

narrower and mixed with country rock at other points, being traceable by stripping at intervals for a considerable distance. It was heavily mineralized with leaf iron pyrites and molybdenite. A couple of test pits had been sunk on it, one to a depth of 25 feet, but assays were too low to make the deposit of any value. Another of these bodies was observed on the northern part of the concession. It had much the same characteristics. A shaft had been sunk 20 feet on it, but assays were too low here also to warrant further work. The country rock adjacent to the former deposit is granite and mica schist, and at the latter schist. In the same part of the concession I was shown a quartz vein about three feet in width cutting the schists at a distinct angle. A test pit had been sunk 17 feet on it. In one or two places I observed rusted bands of schist, resembling fahlbands, containing a little quartz. These had been test-pitted also. I saw several other deposits, some of which were zones of schist containing a large percentage of quartz and charged with pyrites. These were all test-pitted and stripped more or less, but unfortunately none carried gold in encouraging quantities, and consequently the concession has been abandoned.

Exploration of Block B.

Block B of the concessions, situated west of the Lake of the Woods, was visited on August 13. The trip was made on Mr. Deacon's small steamer which plied between Rat Portage and the concession camps. A report of this block, explaining the system of prospecting, is contained in last year's report of the Bureau, and a repetition of these details is unnecessary. Suffice it to say that the whole block has been prospected according to the methods described. Mr. Deacon informed me that a force of 27 men on an average had been employed throughout the season, work having ceased on October 26, 1898, and this block has also been abandoned.

The most promising finds have been tested by shaft-sinking, test-pitting and diamond-drilling, and numerous small test pits have been sunk on other veins of more or less possible value, besides considerable stripping, which constitutes

Occurrences of Gold.

Testing with a Diamond Drill.

an essential part of prospecting operations in this district. A diamond drill had been purchased for the concession, and altogether 3,000 feet of boring done, six different veins having been tested by one or more holes from 100 to 250 feet in depth. Some good assays were obtained from some of the drill cores, but development work did not sustain these results, and the results on the whole of drill cores and of samples otherwise taken were too discouraging to warrant a continuance of operations.

The geological conditions of this block differ materially from those of Block A. An examination of the latter, with a knowledge of the assay results obtained and a consideration of the nature of the formation thereof, would give ample reasons for the belief that nothing of economical value would likely be found thereon; but, as Mr. Deacon intimates in his report, it would be expected from the geological nature of this block that remunerative deposits would be found, as the formations do not differ essentially from those in which working mines exist in the same district. A number of the assays obtained are evidence of the justifiableness of this expectation. It cannot be definitely stated that such deposits or veins do not exist, but after the thorough exploration which has been made of the property it does not appear that the chances of finding anything of value are sufficient to warrant further efforts. The total net sum expended in the exploration of the block, as given by Mr. Deacon in his report, is \$22,313, after deducting all assets such as diamond drill, etc. There is no doubt that all expenditures both for this and block A have been made effective use of for the testing of the properties as far as was deemed advisable from appearances.

I visited the Shoal Lake camp only, which is situated in the northern part of the concession, close to Shoal lake. A convenient dock has been constructed for the steamer and a good level wagon road three-quarters of a mile in length extends from it to the camp. Work was then confined to testing a vein which gave encouraging assays from diamond drill cores by a prospect shaft. The vein outcrops on top of

a hill about 40 feet high. It is on the contact between trap and eruptive granite. Tongues of felsite extend from the granite into the trap, and this material is associated in some places with the vein matter. The strike of the vein is nearly east and west and the dip 66° south. It has been stripped for about 300 feet, showing a range in width of from two or three to 10 or 12 feet. A 5-by-9-foot shaft was being sunk on the vein at the time of my visit; it was then 125 feet deep, and reading Mr. Deacon's report later I learned that it had been sunk to 145 feet with 40 feet of drifting from the bottom towards the bore hole. But, as appearances were not encouraging, work was discontinued. At a depth of 70 feet the vein became flatter, and the shaft was continued in the foot wall, but was of course struck again in the drift, as Mr. Deacon informed me. A hoisting plant had been installed consisting of a 12 h. p. duplex double drum hoister with kibble and wire cable and a 20 h. p. return tubular boiler.

A boarding camp and other small temporary houses had been built and a force of 10 men was employed.

Mines of the Upper Seine.

Mining has not been so active in the Upper Seine country during the year as it had been the previous year, owing to the suspension of work at the Sawbill mine. But at Island Falls and other places in the same region a considerable amount of development work has been done. A tri-weekly stage runs from Bonheur to Sawbill, leaving Bonheur on Mondays, Wednesdays and Fridays and returning on the following days. The distance is 33 miles to the landing at Sawbill lake. A canoe trip of two miles on the latter connects the mine with the stage. The road is very rough, making the trip a hard day's work. A general store, stopping place and post office are kept by W. F. Fortune of Port Arthur at Sawbill mine, and a hotel has been built at the Hammond Reef landing by another party. Bonheur is the point of entry, and Sawbill headquarters for the Island Falls, Clearwater lake and Steep Rock lake districts.

Geological character of the Tract.

Slackness of work in the Region.

Work at the Shoal Lake Camp.

Sawbill Mine.

The Sawbill mine had been closed down from March, 1898, until August 29, when a

Operations resumed at the Mine. Toronto syndicate which had bonded the property for a year commenced operations under an agreement to sink the present shaft to a certain depth, along with other exploitation work with a view to thoroughly testing the property for a certain interest in it. Since work has commenced sinking in the shaft has been going on and the mill running continuously on ore stoped from the different levels, etc. The manager of the mine is Captain J. P. Williams. There is a total force of 19, of whom seven are miners. The following are the underground measurements up to November 23: Depth of shaft, 230 feet; first level, north, 182 feet, south, 203 feet; second level, north, 134 feet, south, 132 feet; cross section of drifts, $4\frac{1}{2}$ by $6\frac{1}{2}$ feet. The following overhand stoping has been done: First level, north drift, shaft pillar, 16 feet; first stope, 91 feet long with a raise of 37 feet above the roof of the drift for the first 75 feet, 27 feet for the next 15 feet and from four to six feet for the remainder of the distance; average width, $3\frac{1}{2}$ feet; second stope, at end of drift, 20 feet long, three feet raise above drift and three feet wide. South drift, shaft pillar, 15 feet; first stope, 81 feet long; average height above the roof of the drift, 19 feet for the first 60 feet, with a width of from four to six feet and six feet above the drift for the remainder of the distance, with a width of three feet; second stope, 27 feet long, four feet above drift and three feet wide. Second level, north drift, stope 34 feet from the shaft, 73 feet long, raise 20 feet (average) above the drift, four feet wide; drift under the stope widened to six feet. South drift, shaft pillar, 20 feet; stope, 62 feet long, with 18 feet average raise above drift, and a width of $5\frac{1}{2}$ feet. At a distance of 67 feet from the shaft in the north drift of the second level an upraise has been made 33 feet above the roof of the drift, and will be continued to the level above. The vein underground ranges from two to five feet in width and averages $3\frac{1}{2}$ or four feet. It has widened near the bottom of the shaft to six feet, as far as I could see, and I am told to eight feet

at the bottom, there being a few feet of water.

Suitable stulls are provided where required in the stopes, for retaining the broken ore; a row of stulls is placed along the roof of the drift under the stope and mill holes carried up from the same through the broken ore, which goes through to the cars below.

Tramways are laid in all drifts, and trucks are provided which convey the ore bucket.

The ladderway has been suitably cased off from the hoisting compartment for a depth of 180 feet, with ladders and platforms suitably arranged. The shaft house was hardly large enough to enable a satisfactory guard rail to be placed around the shaft mouth without causing inconvenience, but instructions were left to increase the height of the present guard rail if too much inconvenience was not caused thereby.

Blasting in the shaft is done by electricity. Explosives are not stored underground, only sufficient being brought down for immediate use. The powder magazine is situated about three-quarters of a mile from the shaft, and at a safe distance from other buildings. The ventilation is satisfactory.

While drilling at the bottom of the shaft on September 20 water under high pressure was struck, the force being such as to cause the entire suspension of sinking operations down to the time of my last visit, November 23. Two and three, and sometimes more, pumps had been worked to their full capacity all the time to keep the shaft from being flooded. It was found necessary to purchase larger pumps than those already in use, and a Northey sinking pump of 110 gallons per minute capacity was installed, but this was drowned entirely and remained so for some weeks until a second pump of the same make, but of 50 gallons capacity, was put in, and with the help of the other pumps already in use the water was got under control. It is estimated that at least 5,000,000 gallons had been pumped out of the shaft during the first two months after the water had been struck, and as far as could be calculated it was coming in with unabated force up to the time of my last visit. An effort will be made to continue sinking by tapping the water on one side of

Condition
of the
Workings.

Strong flow
of Water.

the shaft. A drift will be driven 10 feet from the bottom, and a winze sunk at the end, at the bottom of which it is expected the water will be tapped. A pump will be stationed in the drift, with the calculation that the water can be sufficiently well coped with to allow continuation of sinking in the shaft. Experiments will be made with a view to utilizing this water for mill purposes, in order to eliminate the expense of pumping from the lake, the present source of supply, which was resorted to as a consequence of the small creek which had been dammed above the mill having proven inadequate.

An extension has been built to the hoisting engine house for a new 35 h. p. locomotive style boiler, formerly employed at the saw mill, and substituted for the previous hoister boiler. No

Mining and
Milling
equipment.

other change has been made in the hoisting plant. A tramway 80 feet in length, on a trestle about five feet in height, has been constructed from the air shaft dump to connect with the main tramway to the mill. Practically no change has been made in the milling machinery; but henceforth no concentrating will be done, as the low percentage of the concentrates in conjunction with their limited assay value precludes the advisability of incurring the necessary extra expense required to operate the concentrating machinery, which consists of a Brown's hydrometric sizer and three Frue vanners, as described in last report. The following details of mill practice, although still subject to slight variation consequent upon further experience, will be interesting to some readers: Number of stamps, 10, in two batteries of five stamps each; weight of stamps, 750 lb.; height of drop, seven inches; speed, 80 to 103 drops per minute; capacity of mill, 20 tons per 24 hours; depth of discharge, seven inches, maintained constant by false bottoms; amount of water used, 60 to 70 gallons per hour per stamp; screens, 40 mesh, burr slot; apron amalgam plates, eight feet in length by width of the mortar; inclination, $1\frac{1}{2}$ -inch per foot; inside plates, back, 12 inches in width; front, four inches; lip plates, seven inches in width; amount of mercury fed to battery, a lump about the size of a pea to each battery every half hour.

A 30-light dynamo made by the General Electric Co., and driven by a 5 h.p. vertical engine, has been installed for lighting the mill and other surface works.

The only new building consists of a pump house at the lake.

Instructions were left not to allow exhaust steam to escape in the shaft near where men were working; to remove all loose rock from the walls of stopes, and to increase the height of the guard rail at the shaft's mouth as stated before.

Instruc-
tions.

Hammond Reef Mine.

The Hammond Gold Reef has been in steady operation during the year, with a force varying from 20 to 30 men, under the management of James Hammond, with W. Tedford as assistant manager. The mill has been running most of the time, treating ore from the various open workings on the property.

Nothing but open mining has been done since last year. This consists of the following: A few hundred tons have been blasted out in the old open cut on 337X during the summer, but as the pay streak proved to be narrow the work was discontinued. The present scene of operations is on the southern boundary of 338X, and partially on 316X adjoining, where an excavation 80 feet in length, 25 feet in width and 15 feet in depth has been made and is being continued northward towards the mill on 338X. Very satisfactory results have been obtained here. As the workings are in low ground, practically in a muskeg, or peat bog, sometimes as much as nine or ten feet of earth, peat and moss has to be stripped off. Water has also to be contended with, but a small pump keeps this under control. The reef has been tested at numerous points where it is high and dry, but as results were less satisfactory than here the expense of stripping, etc., is warranted. The vertical faces of the excavation are divided off into squares of one square yard each; each square is carefully sampled and assays made, thus forming a guide to operations. A costean 30 feet in length, 14 feet in width and about 12 feet in depth had been made north of the mill on 338X, and abandoned. Although a considerable amount of

Extent of
Mining
Work.

work has been done upon the Reef on the whole, as yet a comparatively limited knowledge of its constitution regarding gold contents has been obtained, and in order to be in possession of somewhat definite knowledge of the position, size, depth, etc., of the pay streaks, (providing it is found necessary to confine mining operations to the location and working of such) a considerable expenditure of time and energy in systematic exploitation will be necessary.

The tramroad from the large open cut on 337X to the mill has been removed, and one about 250 yards in length laid from the present workings to the mill. The derrick, hoister, etc., from the old open cut have also been removed to the new workings. The hoister is a 12 h.p. duplex. A new 32 h.p. locomotive style boiler has been installed. A 14 by 24-foot boiler and engine house has been built. One machine drill is in use.

With the exception of repairs and minor alterations, no change has been made in the mill. The old upright crusher

boiler has been replaced by the horizontal boiler formerly at the pumping station at the lake. The engines, belts, etc., have been provided with guard rails as required. Number of stamps, 10, in two batteries of five stamps each; weight of stamps, 750 lb.; height of drop, eight inches; number of drops per minute, 86 to 87; capacity of mill, 15 tons per 24 hours; material of shoes and dies, white iron first employed, but manganese steel now used; depth of discharge, $6\frac{1}{2}$ inches when dies are new, not maintained constant; screens, 40 mesh horizontal, burr slot; apron amalgam plates, slope $2\frac{3}{4}$ inches per foot; front and back inside plates; two dash plates; about $\frac{1}{4}$ oz. of mercury fed into batteries altogether every three hours. No extra hands are required for running the concentrating machinery, which consists of two Frue vanners as mentioned in last year's report.

A new assay furnace has been built of stone and fire brick, with separate crucible and muffle compartments.

The water supply from the mill is obtained from the lake, through 2,379 feet of pipe, buried to prevent freezing. A No. 6 Cameron

pump and a vertical lidgerwood boiler constitute the pumping machinery. A dam 175 feet long and about 12 feet high at the centre, constructed of timber, with earth in front to seal the water off, has been built above the mill, on a small creek which flows past the latter. The water was dammed off at another depression by an earthen dam 80 feet long and five feet high. But as the water proved to contain too much vegetable grease for milling purposes recourse was had to the lake again.

On the creek which runs from Clearwater to Sawbill lake a waterfall occurs, which, it is calculated, is capable of furnishing about 500 horse power when developed. The lake has been dammed at the point of outflow, and farther down the creek two other dams were being constructed at the time of my first visit, to furnish the necessary head. These, I learned later, have been completed. Power will be transmitted by electricity to the Reef.

Instructions were left to renew the driving pinion on the hoister, as the present one is too much worn for safety.

The manager of the Hammond Gold Reef is also in charge of 320X, a property about a mile to the north of the former, belonging to Major Cartwright, a son of Sir Richard Cartwright, president of the Hammond Gold Reef Mining Company. The ore body is of the same nature as, and is believed to be an extension of, the Hammond Reef. A wagon road has been constructed from the latter property, and work has been going on intermittently since May 31, six miners being employed.

Toronto and Western Co.

The Toronto and Western Mines Development Company, Limited, with head office at Toronto, have been sinking on several of their properties on the southern part of Sawbill lake and vicinity for the past two summers. The only place visited was 401X, a small island of $2\frac{1}{2}$ acres in the southern part of the lake. The formation is altered granite. A diorite dike 50 feet wide and dipping 45 degrees north crosses the island in a direction of N. 53° W. A couple of smaller dikes occur on the island

also. Small contact veins of quartz a few inches in width occur on both walls of the main dike. The main vein crosses the north-west side of the island with a strike of north 37° east and a dip 75 or 80 degrees east. Two shafts have been sunk 145 feet apart on the vein. One was sunk 23 feet and discontinued, and the other 50 feet. The vein ranges from 10 or 12 inches to $2\frac{1}{2}$ feet in width. A force of six miners was employed, working day and night shifts, under Peter McKellar as superintendent of the work.

Big Six Mine.

In the early part of June I visited the Big Six mine, situated on the east end of Eye lake, south of Clearwater lake. We paddled to the lower end of Sawbill lake into a small inlet from which a rough portage, half a mile in length, led to Clearwater lake. A seven or eight miles paddle brought us to the lower end of the lake, where we left our canoe and walked to the mine, a distance of a mile over a very steep wagon road. The property consists of WR56, 57 and 58 and BG13 to 17 inclusive, aggregating 290 acres; also timber limit 63, containing 1,600 acres, which contains plenty of good Norway pine and other timber. The owners are the Clearwater Gold Mining Company, with head office at Saginaw, Mich.; capitalization \$1,000,000 in \$1 shares. President, W. F. Stevens; secretary, Charles P. Anderson. Mr. J. S. Steele is manager of the mine. He had been prospecting for the company during the previous year, discovering the present property in June, 1897. Work was commenced in the following October and has been continued ever since. There was a total force of 22 men at the time of my visit; of these nine were miners, working in two shifts in the shaft.

The formation is eruptive granite of apparently two different ages, and green chloritic schists, hornblendic near the contacts. The granite has the appearance of that of the Sawbill country. There are several veins on the different locations. The main one is on the contact which passes through the centre of WR56, with a strike of north 12° east. It outcrops on top of a hill 180 feet above and about one-third

of a mile from Eye lake, furnishing an excellent opportunity for transportation of ore by gravity to a proposed mill site on that body of water. The vein is distinctly traceable, and has been stripped to a considerable extent for a distance of about 1,000 feet north of the shaft, which is sunk on the vein near the centre of the location.

The shaft is six by ten feet in size and 80 feet deep, sunk on the hanging wall, which dips nearly 90° degrees east. At the bottom a drift has been driven seven feet south. At a depth of 25 feet a cross-cut has been driven west 16 feet. The vein at the surface consists of two branches at the shaft, about 20 feet apart, aggregating eight or ten feet of quartz. These come together north of the shaft, where the vein averages three or four feet in width. The quartz is white, containing iron pyrites, galena and zinc-blende. A ladderway is in course of construction. Ventilation is obtained by a Sturdevant blower. Windlass and bucket are at present employed for hoisting, but a steam hoisting plant is on the premises ready for installation. The machinery consists of a duplex hoister with 4 by $6\frac{1}{2}$ cylinders (having a guaranteed capacity to hoist 1,500 pounds a distance of 600 feet) 300 feet of seven-eighth inch steel wire cable, a 25 horse-power locomotive style boiler and two underground trucks.

East of the main vein at the bottom of the hill on the same location, a tunnel has been driven southwest 15 feet on a $3\frac{1}{2}$ foot vein, which cut off sharply at the end with distinct evidence of faulting. West of the main vein in the greenstone several felsite dikes containing a little quartz occur, scattered over a distance of 100 feet or more. Shots have been put in on some of these, and stripping done at a number of points. East of the main vein a small quartz vein 19 inches wide outcrops and is said to be traceable for 1,000 feet.

Some test-pitting has been done upon veins on unsurveyed land in the vicinity of the Company's property. One pit was sunk 10 feet and another one has been commenced.

The camp is beautifully situated on the gently sloping shore of Eye lake, on a splendid sand beach about half a mile in length. Temporary log houses have been built for

boarding camps, etc., and a neat and substantial office building has been put up.

Camp and saw mill. The other buildings will be replaced by frame ones as soon as the saw-mill is completed.

The saw mill which has a capacity of 15,000 feet per day, is being built on Eye lake about one-quarter of a mile from the camp. All the machinery is on the ground and will soon be in place.

A waterfall on Seine river, south of Moose lake, has been applied for and is being examined by an engineer for power purposes.

New Golden Twins Mine.

The New Golden Twins mine consisting of location BC18 and 327 and 328X, situated on the western shore of Clearwater lake, about four miles north of the portage to the Big Six, was visited in the early part of June while

Mining locations BC18 and 327 and 328X. returning from the latter place. The property belongs to the Golden Twins Mining Company of London, England. Mr. E. Giessen (since deceased) was manager of the mine at the time of my visit. Work had been going on since October, 1897. The force consisted of three miners and two general hands. The workings are on a small peninsula containing four or five acres. The formation is green schist. The ore body is a large, irregular quartz vein from 10 to 25 or 30 feet in width, with indefinite walls extending across the peninsula and on to the mainland, with a strike of north 35° east, and traceable for nearly 1,000 feet with the greater portion exposed. Two shafts have been sunk on the vein on the peninsula 240 feet apart, and at an elevation of 30 or 40 feet above the water. No. 1 is five by seven feet in cross-section and 63 feet deep. Being partially full of water it could not be entered, but the foreman informed me that at a depth of 47 feet a cross-cut had been driven northwest 22 feet. No. 2 shaft is of the same cross-section and 16 feet deep, sinking being continued. The buildings consist of cook and dining camps, office, blacksmith shop and powder house.

Island Falls Region.

I paid two visits to the Island Falls country during the summer and found that active

work had been going on at several properties there all summer and part of the winter. A canoe trip of about 12 miles, with two short portages, up the Seine river from Sawbill, is the most convenient means of access. The formation is altered granite, similar to that of Sawbill, and the veins are all true fissures, containing white quartz of the same nature as that of the aforementioned place.

Location AL282.

The most extensively developed property is AL282, which had been involved in a property litigation from the time of its first acquisition until a considerable quantity of development work had been done. James Hammond of the Hammond Gold Reef was one of the parties contending for the title, and he had sold an interest in it to the Railroad Mining and Development Company, Limited, with headquarters at Port Arthur. This company did the development work, but Mr. Hammond lost the case, involving the patent, but received compensation for work done. He bought back a half interest in the property and gave over to the Railroad Company, by way of compensation, a full title to AL283, an adjoining property containing an extension of the AL282 vein.

There is one vein on AL282, which is a true fissure, crossing the location, and others adjoining, with a strike of north 57° east approximately. It follows a small ravine with a bluff 15 or 20 feet high extending along the north side. The vein dips at an angle of about 65 degrees northwest into the bluff at the bottom. Test pits several feet in depth have been sunk on the vein all along, on this and adjoining locations. Some of these pits have only been sunk to bed rock, as the vein being in low ground is not exposed at any point except where test-pitted. For the greater part of the distance it underlies several feet of clay, besides moss, etc. In some of the test shafts or pits the vein is exposed as a well defined quartz body, several feet in width, with distinct walls. Usually on one or both walls several inches of clay selvage will be found. This selvage is apparently a decomposed inclusion of green schist, as it is found associated with nearly all veins in this country.

and usually manifests itself as a continuous band of green schist, outcropping sometimes with a width of two or three feet. Its presence probably produced a line of weakness along which the faulting and fissuring of the country rock took place. In other test pits the vein consists of a zone of broken schistose granite, giving evidence of shearing and pressure. Usually a little quartz is present. The bluff or escarpment on one side of the vein, which is characteristic of more than one vein in this section, is probably caused by the upward throw of the hanging wall.

At a distance of 40 feet from the vein a 7 by 9 foot shaft has been sunk vertically in the hanging wall, striking the vein at a depth of 71 feet, and from there is continued as an incline on the vein for a farther distance of 70 feet, making 141 feet altogether. At a depth of 96 feet drifts seven by seven feet in cross-section have been driven northeast and southwest along the vein 65 feet and 72 feet respectively. These figures were obtained from Mr. Hammond and the manager of the mine, as mining operations were not in progress at the time of either of my visits and the shaft was partially full of water. The average width of the vein in the shaft is 17 inches, and in the drifts three feet.

A neat and roomy shaft house has been built, also a substantial and well-constructed head frame. The shaft is provided with a suitable collar, and is properly guarded at the surface. The hoisting machinery consists of a 15 h.p. hoister and a 25 h.p. vertical boiler. A three-drill Sarjeant air compressor with three drills and a three by 14 foot receiver have been installed. A No. 4 Cameron pump is employed for drainage purposes.

C. C. Schrouitz, formerly of the Sawbill, was manager at the time of my April visit. There was a force of 16 men all told. The buildings consist of cooking and sleeping camps, office, two storehouses and shaft and engine house, all neatly and substantially built. About 30 acres of land have been cleared. The property is reached from the Seine River landing by a foot trail of a mile in length, or by a road which is in poor condition for summer travel.

Location AL283.

The adjoining location AL283, previously mentioned, originally owned by Mr. Hammond and transferred to the Rail-
Development Work. road Mining and Development Company, as stated, has been under development since May 1, 1898. C. C. Schrouitz, the manager of AL282, was also superintendent of this property, and John Chapman foreman. A force of from eight to 11, all miners except two, has been employed continuously.

Four test shafts have been sunk on the vein (which is a continuation of the AL282 vein as stated before) at intervals of a few hundred feet, two of these being continued. No. 1, close to the boundary of AL282, is seven by seven feet in size and 22 feet deep. There is six feet of vein matter between walls, of which 18 inches is quartz, which is mineralized with copper and iron pyrites and galena. No. 2, the next pit going northwest, is 42 feet deep, with an inclination of 45°. It is provided with an eight by eight foot collar, 15 feet deep. The vein matter consists of a mixture of quartz and country rock. No. 3, 400 feet farther northwest, is seven by 13 feet inside the timbers and 75 feet deep, on an inclination of 45°. The collar is 24 feet deep. A very satisfactory showing of quartz, 13 feet in width, is exposed on the east end of the shaft, but on the west end the vein has changed suddenly to protogine, with a slight admixture of quartz. For hoisting, a double skidway with counterbalancing buckets is employed. A small hand force pump is used for drainage purposes. Ventilation is secured by a blower, with tubing extending down the shaft. A ladderway has been constructed. Blasting is done by electricity. No. 4 shaft is near the northwest boundary of the location. It is 15 feet in depth, and exposes 10½ feet of quartz with selvage on the walls.

Location AL198.

W. D. Pettigrew is working on AL198, a location of 40 acres, which is claimed to contain the southwestern extension of
Development Work. the AL282 vein. The ravine corresponding to the strike of the vein is in evidence here. A shaft has been sunk to a

depth of 49 feet on the vein. There was eight feet of quartz on the surface, which pinched out at a depth of 13 feet, but is coming in again at the bottom. A cross-cut has been commenced into the foot wall in order to ascertain whether the main body lies in that direction or not. The quartz is charged with copper and iron pyrites and galena. There is a clay selvage on the walls, which are six feet apart, and filled in between with vein matter similar to that of the preceding properties. The shaft is provided with a collar 15 feet in depth and seven by 10 feet in cross-section. Hoisting and tramming machinery consist of a gin, ore bucket, head frame, several yards of tramway and ore car. The manager is Joseph Huston. A force of seven miners is employed. The buildings consist of cooking and sleeping camps, office, blacksmith shop and powder house. The location is plentifully supplied with timber for mining and building purposes. The property is about half a mile from the Seine river and is reached by a foot trail.

Proudfoot's Location.

Adjoining the preceding property on the southwest is a location owned by H. B. Proudfoot, of Port Arthur. The same vein outcrops here on elevated ground. Two shafts 50 feet apart have been sunk, 15 and 25 feet deep respectively. There is $2\frac{1}{2}$ feet of quartz visible at the former, and over five feet at the latter. The owner was instructed to fence the shafts properly.

Locations AL298-9.

About a mile from the previous properties is the Roy mine, reached by a road $2\frac{1}{2}$ miles in length from the Seine river. The Roy Mining Co. The locations consist of AL298 and 299, aggregating 75 or 80 acres. The property is owned and is being developed by the Roy Mining and Development Company. C. C. Schroutz had charge of the work in the spring, but since then Roy Sweeney of Toronto has assumed the duties of manager, with Gus A. Bawden as foreman. There is a total force of 13, of whom eight are miners working in two shifts.

There is one vein on the property nearly parallel to, and at a distance of a mile from, the AL282 vein. It is traceable, with strip-

ping for most of the distance, for about 400 feet, forming a slightly elevated ridge with a strike of about north 70° east and a dip of 55° northwest, running into a swamp at each end. It ranges from three to five feet in width on the surface, with an average of about four feet. Accompanying the vein is a band of weathered green achist, traceable for about 100 feet.

A shaft of eight by eight feet has been sunk in the vein to a depth of 81 feet, and is being continued. At a depth of 100 feet cross-cutting or drifting will be commenced. There is a distance of nine feet between walls, the intervening vein matter being chloritized schistose country rock (altered granite) irregularly mixed with quartz, of which there is an aggregation of several feet in width. The hoisting machinery consists of an eight h.p. hoist, a 10 h.p. horizontal boiler, etc., with a substantial head frame. A small steam pump drains the shaft. Blasting is done by electricity.

At the northeast and southwest ends of the outcropping of the vein test pits have been sunk 18 feet and 10 feet respectively.

The buildings on the property are boarding camp, warehouse, office, and powder magazine.

Laguerre lake, with an area of three or four hundred acres, furnishes an excellent mill site at a distance of 900 feet from the mine, at a sufficiently low elevation to allow of gravity transportation of the ore.

Location WN5.

On June 7 I visited a property on the north shore of Reserve island, where work was in progress under the superintendence of Dr. S. Wilkinson. The only information I could obtain was secured from a couple of miners working there. The property consisted of three locations, with only one, WN5, under development. The men were employed and housed under canvas close to the water's edge. The workings were about half a mile back from the shore, reached by a foot trail.

Two veins had been discovered. The main one is traceable for over a half mile at least, and, it is claimed, for about three miles, with a strike of north 20° east dipping

at an angle of 75° northwest into the base of a bluff similar to the vein on AL282. In fact it bears a strong resemblance to this latter vein, and is believed to be an extension of it, although the difference in strike would indicate considerable curvature in the vein. It has been stripped and test-pitted for a distance of 150 yards, exposing a width of from two to eight feet, with well defined walls and associated bands of green schist. This portion of the vein ends up in a large outcropping of quartz over 40 feet in width and 70 or 80 feet in length, which is believed to be the junction with the other vein which comes in from the south with a strike of north and south. A test pit six feet deep had been sunk on this supposed junction. At intervals of a few hundred feet or less along the strike of the main vein south of the junction, small test pits have sunk all along, most of these being merely to bed rock, to show the continuity of the vein.

The branch vein outcrops along the face of a hill for a distance of 100 or 200 feet, with a dip of about 45° east. It is exposed by test-pitting in several places, showing a width of three or four feet. About 200 yards south of this, on the same strike, a mass of apparently solid quartz rises out of the muskeg to a height of 12 or 15 feet, with a width of about 40 feet, and a length of 70 or 80 feet.

Mines on Lake Superior.

Expectations of extensive workings on the north shore of lake Superior were not realized last year, owing to lack of capital, but some progress has been made and it is expected that several properties will be worked during the present year.

Ursa Major Mine.

The only property under development east of Port Arthur is the Ursa Major mine, which consists of locations AL219 and 220, containing 320 acres each and situated on a Government road

which extends three miles beyond the Empress mine, near Jackfish bay. A road 10 miles in length connects the mine with the railway track. The property is owned by the Jackfish Bay Syndicate Mining Company,

Locations
AL219
and 220.

Limited. Head office, 23 Toronto Street, Toronto. President, C. B. Jackes, and general manager and acting secretary, G. H. Patterson.

Work was commenced on August 8, 1898, under the management of Mr. E. R. Storrs, with a force of six to eight miners, and has been going on continuously. The place was visited on November 19, 1898.

The formation is green schist with a strike of northwest and southeast. Felsite dikes were observed in one or two cases.

The ore body consists of a series of

roughly parallel veins or bodies of quartz following the strike of the schists and extending over a width of 200 feet. These are only exposed where stripping has been done. A trench 239 feet in length cut through drift material to bed rock across the ore body reveals four or five quartz bodies or branches from six to eight feet in width. A vertical shaft, four by nine feet in cross-section had been sunk 53 feet and was being continued. Quartz is exposed on all sides in the shaft. Iron and copper pyrites is plentiful, with a little galena and zincblende.

A neat collar has been constructed to a depth of 27 feet. A windlass and counter-

balancing buckets are employed for

hoisting. A small hand force pump is employed for drainage purposes. Owing to the expense of getting in supplies, which amounts to \$20 per ton as a result of the bad roads, the cost of sinking amounts to about \$50 per foot. The buildings on the property consist of cooking and sleeping camps, shaft house and blacksmith shop, stable and assay office. A good assaying outfit is provided so that a thorough knowledge of the vein is obtained as the work progresses.

Empress Mine.

The Empress mine was visited on November 19, and found in the same condition as when inspected last year. Mr. James E. Smith is looking after the property.

Slate Islands.

I am told that considerable prospecting has been done on the Slate islands during the summer and that some valuable discov

eries have been made, with the result that development work will be commenced in the spring.

Silver Mining.

Silver mining has been more active during the past year. More of the old mines have been opening up, and present appearances are that this industry, which has revived after years of suspension, will continue to increase until once more of considerable importance to the Province.

Rabbit Mountain Mine.

The Rabbit Mountain mine, formerly owned by Mr. Alexander M. Hay of Rat Portage, had been acquired by the Dominion Gold Mining and Reduction Company, Limited, of London, England, in the latter part of December, 1898, and Mr. Hay informed me that on January 20, sinking had been resumed in the shaft, which is 240 feet deep. Two machine drills are in operation.

Silver Mountain Mines.

The East End mine at Silver Mountain was closed down on September 18, 1898, having been in operation on a limited scale for the greater part of the summer. A little exploitation, principally in the form of stoping, had been carried on in the old workings, resulting in the decision that nothing further will be done therein; but if work is resumed in the future it will in all probability be on a small rich vein which occurs a few hundred feet north of the present one.

Mr. De Kalb and myself went through the old tunnels on August 24. No. 2 tunnel is 1,800 feet in length, with an irregular course. We observed many features of vein formation which were very beautiful, as well as interesting from a scientific standpoint. No. 1 tunnel is 70 feet above No. 2 on the same vein.

The mill had been running the greater part of the time, milling the dumps from the tunnel and from No. 2 shaft, which is sunk on top of the mountain and connects with the upper tunnel at a distance of 500 feet from the entrance. The material from the shaft dump was thrown down the shaft to the tunnel, a depth of 80 feet, wheeled along

the tunnel a distance of 300 feet, and again discharged through a winze to No. 2 tunnel, and trammed to the entrance and over a newly constructed tram road to the mill. This tram road is about 150 yards in length, and constructed on a trestle which varies from five to 15 feet in height.

A new Blake crusher with 7 by 10 inch opening has been installed in the mill. The other machinery consists of a Tremaine 2-stamp battery, a Browne's 2-compartment hydraulic classifier and two Frue vanners, along with boiler and engine.

Mr. Richard Sandoe was manager of the mine.

The most important mine in operation at present is the West End mine of Silver Mountain. It is situated one mile west of the East End mine, across the mountain, and is reached by a wagon road about a mile in length from the station of West Silver Mountain, which is 40 miles from Port Arthur, on the Port Arthur, Duluth and Western Railway. A fairly good road 36 miles in length extends from Port Arthur to the mine, enabling the trip by this route to be made in a day.

The property of the mine consists of three locations, R55, 56 and 57, containing 80 acres each. It is owned by the West End Mining Company of St. Paul, Minn., and has been re-opened after some years of idleness by the West End Mines Syndicate, among whom are Mr. Herbert Shear, manager of the mine, the Wiley Bros. of Port Arthur, and others. The post office address of the mine is Silver Mountain. Mr. Colon Tonkin is captain, and there is a total force of 40, including 18 miners.

The formation consists of flat-lying slates of the Animikie period, overflowed in a number of places by diabase. These areas of diabase are marked by constituting the cappings of numerous small mountains left by the glacial ice which removed the intervening soft slates to a considerable depth. A formation of dolomitic limestone lies underneath the slates. The silver occurs as argentite and native silver in veins caused by the faulting and fissuring of these formations; the gangue material is quartz, calcite, barite and fluorite, in varying

West End
Silver
Mountain.

East End
Silver
Mountain.

Geological
Formation.

proportions. The richest part of the vein is usually that portion which occurs in the slates directly underneath the trap.

There are three shafts at the West End mine, only one of which is in operation.

No. 1 shaft is said to be 150 feet deep, but is partially full of water and unused at present, except for ventilation purposes. No. 2 shaft is 540 feet east of No. 1, and of the same depth. Mining has been all confined to it since the re-opening of the mine by the present syndicate. The third shaft is 800 or 1,000 feet farther east and is abandoned.

No. 2 shaft, as stated before, is said to be 150 feet deep, and dips 85 degrees north. The cross-section is 8 by 10 feet inside the timbers. The first level is 35 feet from the surface; a drift has been driven east 105 feet, and one west 127 feet. The second level is 60 feet from the surface, with an east drift 30 feet long and a west drift 212 feet. The third level is 90 feet from the surface, with an east drift 200 feet long and a west drift 380 feet. Work is all confined to the west drifts. A winze connects the first and second levels, and another the second and third west of the shaft. There is also connection between the end of the west drift in the third level and the east drift from No. 1 shaft, affording good natural ventilation. No work is going on below the third level in the shaft at present, but sinking will be resumed sooner or later.

The following overhand stoping has been done: Second level, length of stope, 30 feet; height above roof of drift, 11 feet; width, five feet. Third level, first stope, length, 70 feet; height, carried up to second level; width, five to seven feet. Second stope, length, 70 feet; height, 30 feet; width, six to nine feet. In the east drift, No. 1 shaft, the underhand stope has a length of 70 feet, a depth of three feet, a width of eight feet. The fourth stope has a length of 50 feet, a height of three feet, and a width of 12 feet.

Stulls in the drifts and stopes are sound and well set. A row of stulls is placed along the roof of the drifts under stopes, and the ore is shot down on them and sent through mill holes to cars below. The ore from the upper levels is all sent through the winzes to the

third level and trammed to the shaft. The shaft is securely timbered, with a collar 18 feet deep. A suitable manway is provided and cased off from the hoisting compartment with landings at suitable intervals and ladders set at proper angles. A suitable ladderway is provided in No. 1 shaft also, furnishing an additional means of escape.

The mine is drained by a No. 5 Cameron pump, situated in the third level, the bottom of the shaft collecting all drainage water.

Dynamite is sent underground just as required for charging holes. The magazine is situated a quarter of a mile from the shaft.

The hoisting machinery consists of a 10 h.p. single cylinder hoist, with 28-inch drum, steel wire cable, and wooden kibble

sliding on an inclined plane. Steam

is furnished by a 20 h.p. vertical boiler. New shaft and engine houses have been built to replace the old ones burnt down in September last. Tramways extend from the shaft mouth and from the dump to the mill, the former distance being 250 feet and the latter 180 feet. They are laid on a trestle which varies from 10 to 39 feet in height and is 180 feet long, one tramway being 15 feet below the other. Two self-dumping cars are in use.

The mill, which was erected last summer and has been in operation since September 5, is the ordinary gravity stamp mill, with Frue vanner concentrators such as are used in the treatment of free milling gold ores, with the exception that no amalgamation is done; hence a conspicuous feature of the gold mill is absent. The mill is conveniently situated with reference to the shaft, so that the movement of the ore is aided by gravity from the time of its arrival at the shaft until the discharge of the tailings. The machinery is from Fraser and Chalmers, and consists of a grizzly, Blake crusher with 7 by 10 inch opening, two batteries of five stamps each, the stamps weighing 950 lb. apiece, two Challenge ore feeders, a 4-compartment Browne's hydraulic classifier and three Frue vanners with 6 by 13 foot belts one corrugated. The capacity is about 40 tons per 24 hours. Power is furnished by a 150 h.p. Conway automatic cut-off engine and a 48 inch by 15 foot return tubular, 60 h.p. boiler.

A considerable quantity of the ore is very rich; all over a certain grade is bagged underground, brought to the surface, crushed, sampled and barrelled by hand, and shipped directly to the smelter, Omaha being the principal destination. All lower grade material, down to four or five oz. per ton, is treated in the mill, and the concentrates sent to the smelter. All material shipped is carefully sampled and assayed, furnishing a satisfactory check upon the smelters. There is about three or four thousand tons in the dumps of both shafts which will be treated in the mill.

The present water supply is Lizzie lake, a small body of water on top of the mountain, at an elevation of 91 feet above the tank in the mill, and connected with the latter by 4,000 feet of 2½ inch pipe, laid along the surface of the ground and boxed in to prevent freezing. The water is syphoned from the lake, the highest point in the syphon being 20 feet above the lake level. The pipe discharges into a cistern close to the mill, but is also connected to the tank above the mill if required to fill it directly. A No. 7 Cameron pump is installed for emergency, and connected with the syphon.

As the supply of water is limited, a device has been invented and put into practice by Mr. Shear, the manager, which saves about half the water from the tailings for use over again. The tailings are charged by a distributor into one end of a wooden box with pointed bottom, six by 13 feet in size at the top and seven feet in depth. This works on the spitzkasten principal; one half of the liquid material (containing all the solid matter) being discharged through an orifice in the bottom, with valve regulator, and the other half (nearly pure water) flowing over the lower end, whence it is conducted to the cistern. Now the water flowing over the lower end is caused to flow in a very thin sheet over a perfectly horizontal edge, careful adjustment being required to secure this. Surface currents are thus prevented from forming except at the very edge; hence all solid material has time to settle and get discharged at the bottom. The water from the shaft was first used, but will not likely be required now.

Two wood chutes have been constructed

from the top of the mountain, one to the hoister about 125 feet in length, and one to the mill, about 200 feet

The buildings consist of two shaft houses, hoister house, blacksmith shop, mill building, office, manager's dwelling, general boarding camps, private dwellings and several miners' cabins.

All requisitions previous to my last visit dealing with the maintenance of safety to employes underground and on surface have been complied with. The following instructions were left on last visit: Fence or cover winze in second level. Carefully scale walls in stopes where required. A more suitable and safer method should be devised for getting access to crusher in mill.

About 400 or 500 feet west of No. 2 shaft an adit four by seven feet in cross-section had been driven north 90 feet into the foot of the hill, cutting a series of parallel veins or branches. At the end a winze had been sunk 14 feet and contained about eight feet of water. This is all old work. It was in this adit that the accident occurred which resulted in the death of Wm. Montgomery, who lived at the mine.

Reduction Works.

The interest in improved processes for treating ores is well maintained, and during the past year more than the usual number of claimants appeared who were confident of winning favors by the success of their methods. In the vicinity of Rat Portage three plants are attracting notice, but only two of them have been practically tested.

Rat Portage Works.

On September 9 the Rat Portage Reduction Works were visited. A 60-ton lot of ore from the Sentinel mine was being treated, Mr. Wm. Peters superintending the milling. No change has been made in the machinery or the ownership of the works; but Mr. A. D. Upton of Duluth, who has been interested in the development of mining properties in this vicinity for the past year or two, has secured an option on the works and may form a company and take them over.

Norman Works.

A new reduction works is being built at Norman, about a mile west of Rat Portage,

by the Canadian Gold Extraction Company, Limited, under the superintendence of Mr. R. H. Ahn of Rat Portage. It is purely a customs mill; the ore will be sampled and tested, and bought outright before treating. The machinery has not all arrived yet, nor will the works likely be ready before spring. The treatment will consist respectively of coarse crushing with a Blake or Gates crusher, finer crushing through rolls, roasting, very fine grinding in grinding barrel, amalgamation in revolving barrels, and chemical treatment. The last involves a patented process which the owners are not making public.

Keewatin Works.

The Keewatin Reduction Works, described in last year's report, were completed and in running order in January, 1898, and were kept fairly busy for the remainder of the winter, but unfortunately, during the summer following they were idle for the greater part of the time, with the exception of the assay department; however, prospects for a busy winter again are bright. Some changes have been made in the management of the works. Mr. F. T. Snyder, who had been general superintendent, terminated his engagement with the company on June 17, and this office has been abolished, the duties of it having been distributed over three different offices. The business manager is W. J. Craig, the mill superintendent N. B. Wilcox, and the manager of assay department H. A. Guess. Mr. R. A. Mather is managing director of the works.

Some important changes have been made in the machinery, the necessity of which has been demonstrated by experience. The gyrating concentrators installed by Snyder have been condemned and thrown out, and will be succeeded by Frue vanners and jigs. The gyrators were found to concentrate very satisfactorily, but the difficulty of keeping them in repair and adjustment more than offset any advantage they might possess over the Frue vanners. There are at present four of the latter, with four-foot belts, treating the product from two batteries. Two of these will be arranged to treat the discharge from

the other two batteries, or rather the middlings and tailings from the jigs, which will be interposed between the batteries and the vanners. Two Hartz jigs will be installed, similar to those at the Regina, which have proven to work very satisfactorily. Stationary apron plates four feet long will be interposed between the batteries and the present gyrating amalgam tables; the latter will of course be retained. The batteries have all been changed from wide double-discharge mortars with no inside amalgamation, to narrow single-issue mortars, with front and back inside plates, the same mortars of course being used. Mercury traps have been supplied to all batteries. From 35 to 50 mesh screens are used, according to the nature of the ore treated. The third turbine, installed from the first but hitherto unused, is to be connected solely to the milling machinery for running the same, as the speed requires to be uniform; this being impossible under the present state of affairs wherein all the power comes through the medium of a single shaft, both for the continuous running of milling machinery and the intermittent crushing and sampling and aerial tramway machinery. The two turbines in use aggregate 350 h. p., while the third one will furnish an additional 225 h.p. An extension to the power room will be built. An addition has been made to the sampling machinery of two small Gates crushers, No. 00 and 2; this improves the sampling by finer crushing when necessary, and also obviates the necessity of running the larger machinery for small mill tests.

A jig amalgamator invented by and constructed under the direction of Mr. Guess is ^{The Assaying department.} an addition to the assay department which greatly facilitates the making of free-milling tests of small samples of ore. A series of bottles, according to the number of tests to be made at once, capable of treating one or two pounds each, are charged with the finely ground ore and mercury, securely closed and set in a frame, to which are communicated by machinery 300 two-inch strokes per minute. A very short time suffices to amalgamate all the free gold.

Instructions were given to cover and fence belts in pulleys in several cases, and these have been satisfactorily complied with.

MICHIPICOTON MINING DIVISION

By David G. Boyd, Inspector

I HAVE the honor herewith to present to you the second annual report on the Michipicoton Mining Division. During the past season of 1898 the progress made has been encouraging. The majority of claims in the district between Wawa lake and Michipicoton river have yielded samples showing free gold, and in places where work has been done the vein matter improves the deeper it is worked. Town sites have been laid out, one situated at the west end of Wawa lake named "Wawa City," and one on the Michipicoton river, one mile up from its mouth, named "Michipicoton City." The river is navigable for small tugs with draught not exceeding six feet to the town. The old C. P. R. tote road connects the two sites. At Wawa City a hotel, store, billiard hall and two small houses have been erected, while at Michipicoton are found a hotel and two stores, as well as the houses of the Indians and half breeds who used to work for the H. B. Co. The H. B. Co. have (after being closed two years) re-opened their post under the agency of Jabez Williams, formerly of Lac Seul Post. Prospectors and miners now going into the country can get all their supplies and outfit from the above stores, thus saving the former expense and trouble of bringing in all their outfit.

The first and only machinery in the district consists of a customs two-stamp mill erected by Mr. Thomas Wescott of Sault Ste. Marie, Ont. The stamps (830 lb. each) and frames were made at Sault Ste. Marie. The vanner and copper plates were bought from Fraser & Chalmers, Chicago; the crusher and ore feeder from A. R. Williams & Co., Toronto. The power is supplied by an engine and boiler lately used in a saw mill. On October 13 the buildings had been erected, engine, boiler and stamp frames set up, and foundation for stamps laid. Mr.

Wescott expected to have his mill running before the end of the season.

The office was opened for the transaction of business in one of the H. B. Co. buildings on April 29 and continued open until the close of navigation on October 29. During this period there were 152 miners' licenses issued and 228 notices of mining claims registered and filed at Michipicoton. The total number of licenses issued for the year was 203 (of which number 69 are renewals) 51 being issued from Toronto. The total number of claims staked and recorded was 266, of which 38 were recorded at Toronto while the office at Michipicoton was closed during the winter months.

The amount of money forwarded to the Treasury Department from the office at Michipicoton was \$2,316.50, and the amount received at Toronto was \$907, making a total of \$3,223.50. Of this amount \$2,030 was received for miners' licenses, \$205 for transfer fees of mining claims, and the balance, \$988.50 fees for additional mining claims filed by licensees who had already filed one claim on their license.

All of the claims staked and recorded, with the exception of two on lake Manitowick, are situated in the neighborhood of Wawa lake.

Development Work.

In the early part of the season little development work was done owing principally to the Spanish war, the majority of claims being held by Americans. The myriads of black flies and mosquitoes also hindered operations, it being almost impossible to work on the surface during the months of June, July and part of August.

In the latter part of August and in September and October more work was done, and judging from appearances in October there will be from 15 to 20 camps in operation all

winter. Regarding the work done, as most of the licensees employed their time in stripping the veins and sinking test pits, only the more important are noticed in this report.

On lake Manitowick G. F. Parks had a gang working all winter on claim No. 173 ;

At lake Manitowick he sank three pits, the deepest being 23 feet. At the time of my visit on 7th September, the only operations going on were on claims 79, 80 and 81, with Mr. N. J. Dingman of Palmerston in charge of ten men. Work commenced about the 20th August and consisted in stripping and sinking a shaft on the top of a hill. Later he let a contract for a shaft of 50 feet in depth to be done this winter. This as far as I could learn was all the work that was done in this part of the country. On Dog lake nothing has been done.

Inspection of Work on Claims.

On 6th October I visited claims 33, 34, 35 and 36, situated one mile north of the west end of Wawa lake. These claims

At lake Wawa. are situated on a large vein of quartz heavily mineralized with iron pyrites, also containing pyrrhotite. The strike of the vein is east and west. Work was started in April and continued steadily with an average number of four men in charge of A. Goetz of Sault Ste. Marie, Mich. Besides stripping and sinking test pits, two tunnels have been drifted, the longer being 15 feet in. Work will be continued all winter.

Claim No. 128, "Gananoque," situated three miles east of Michipicoton city, owned

Gananoque claim. by J. Legge of Gananoque and S. Barton of Sault Ste. Marie, was visited on 13th October. The strike of the vein is N. E. and S. W. with a dip of 45° to the north. The vein is well mineralized with iron and copper pyrites, galena and free gold. It has been traced 600 feet over a hill, and varies in width where work has been done from five to nine feet. Work was commenced in the fall of 1897, ceased during the winter, and commenced again in May, 1898. At the foot of a hill 22 feet of stripping nine feet wide preparatory to drifting a tunnel has been done. Half way up the hill a tunnel six by eight feet has been drifted in a distance of 17 feet, besides 19 feet of prepara-

tory stripping. Summer and winter camps have been built and a waggon road cut out to Michipicoton City.

Claims No. 72, "Pixley," owned by Mrs. Hopkins, No. 97, "Woehler," owned by

Claims 72, 97, Mrs. Hopkins, No. 98, "Helen," 98 and 99.

owned by L. M. Ward, and No. 99, "Florence," owned by H. J. Hopkins, were visited on 17 October. Work was commenced in the middle of May with L. M. Ward in charge, and continued until 17 October. On claims 98 and 99 the strike of the vein is nearly east and west. It has been traced 600 feet with an average width of six feet, well mineralized with iron and copper pyrites, with showings of free gold and native copper. Three test pits have been sunk, one of six feet and two of 12 feet in depth. On claim 98 a smaller vein one foot wide, with a strike of east and west, a test pit eight feet deep has been sunk. On claim 99 another vein, four feet wide with a course of northeast and southwest, has been stripped for 70 feet. On claim 97, on a vein running north and south, two pits have been sunk to eight and 13 feet respectively. A log camp 18 by 20 feet has been built.

Claims No. 92, 93, 94 and 95 are owned by the Wawa Gold Mining Co., Ltd., of which

Claims 92, 93 Lt. Col. Tisdale, Q.C., M.P., is 94 and 95. President. They were visited on

18 October. Work was commenced in May and continued until the end of October with an average number of six men, employed under P. A. Derry as foreman. On claim 92 the strike of the vein is northeast and southwest, with no apparent dip; it has been traced 800 feet. The quartz is well mineralized with iron and copper pyrites. A shaft of six by eight feet has been sunk 35 feet, and stripping has been done in several places. On claim 93 two test pits were sunk on the continuation of the vein, one of 6 by 10 and 14 feet deep, the other of 6 by 8 and 10 feet deep. On another vein five feet wide, with a course of north and south and a dip slightly to the east, four test pits were sunk ranging from eight to 15 feet deep. The vein has been traced 500 feet and is well mineralized with iron and copper pyrites and showings of free gold. This claim being situated on a small lake, considerable time was spent in

lowering the level of the water four feet in order to get a suitable place to begin work. On claim 95, on a vein four feet wide with a course of north and south, a pit of 6 by 8 and 16 feet deep has been sunk. A cooking and eating camp was built 15 by 30 feet, the men sleeping in tents during the time they were employed.

Claim No. 75, "Jubilee," owned by the Great Northern Mining Co., Ltd., was visited ^{Jubilee} 18 October. The strike of the claim, No. 75, vein is northeast and southwest with a dip of 40° to the east, well mineralized with iron and copper pyrites and free gold. Work was commenced in November, 1897, and continued until the end of April, 1898, with an average gang of eight men. In this

time a shaft was sunk 7 by 9 and 60 feet deep. Work was commenced again on June 1st and continued until the middle of September, when a cross-cut at the 60 foot level was made 7 by 8 by 26 feet in length, and at 25 feet a cross-cut 7 by 8 by 11 feet in length. The buildings consist of manager's and engineer's houses, sleeping and cooking camps, blacksmith shop and stable. A contract has been let to Mr. M. B. R. Gordon for 50 feet additional sinking, which will be finished during the winter months.

Appended is an amended list of licensees, place of residence, number of license, and number of claim (if any). Where not otherwise indicated the licensees are residents of Ontario.

List of Licensees and Claims.

Name.	Residence.	License.	Claims.
Aiken, D. A.	S. S. Marie, Mich.	244	84
Amyott, —	"	202	419
Anderson, H.	Lakeside	143	
Appleby, J. E.	Toronto	455	
Arms, W. P.	Youngstown, Ohio.	447	230
Armstrong, H.	Michipicoton, ...	145	278, 371, 478
Armstrong, W. J.	Guelph	302	300, 201
Audette, J.	S. S. Marie, Mich.	300	
Baird, J. E.	Bowling Green, Ohio.	183	366
Baluss, H., jr.	Wayne, Mich.	296	488
Barton, J.	S. S. Marie, Mich.	277	188
Barton, S.	" Ont.	265	128 ($\frac{1}{2}$ int.), 264 ($\frac{1}{2}$ int.), 269 ($\frac{1}{2}$ int.)
Bauldrey, W. J.	Michipicoton	169	285
Beirnes, J.	Guelph	162	288
Billings, F.	Cleveland, Ohio.	125	261
Black, J.	Bowling Green, Ohio.	197	405
Black, L.	"	184	367
Blackinton, A. B.	Detour, Mich.	261	282
Boyd, J. F.	Thessalon	124	377
Boyd, J. C.	S. S. Marie	235	208, 209
Boyd, W. S.	"	286	258
Boyer, B.	"	232	360, 425
Boyer, J.	"	211	
Brown, A. F.	"	279	113, 415
Brown, Jane	"	186	364
Bryan, H. J.	"	196	402, 428, 434
Bush, C.	Wawa	297	273
Bush, E.	Hamilton	122	274
Buttrey, L. H.	Guelph	163	289
Calvert, F. H.	Cleveland, Ohio	198	424
Campbell, N.	S. S. Marie	275	472
Carrick, F. J.	Missanabie	205	422
Cass, J.	Michipicoton	204	
Churchill C.	S. S. Marie, Mich.	154	310

Name.	Residence.	License.	Claims
Clark, D.	Palmerston	218	80, 421
Clark, E. D.	Guelph	291	207
Clergue, E. V.	New York	173	68
Clergue, F. H.	S. S. Marie	174	
Cole, L. C.	Bowling Green, Ohio	185	368
Conlon, T.	Thorold	200	401
Cory, E. N.	Pennville, Indiana	199	389, 410
Cowen, F. M.	Flushing, Ohio	242	90
Cowie, J.	Nipigon	445	
Cox, E. S.	Toronto	452	
Cracknell, A. B.	S. S. Marie, Mich.	245	61, 63
Culbert, S.	Missanabie	450	276
Cummins, E.	S. S. Marie	140	375
Davidson, J.	Ottawa	231	45, 249
Derry, P. A.	S. S. Marie	191	416
Dexter, J. B.	Chapleau	130	262
Dingman N. J.	Palmerston	247	79, 420
Donnelly, J. P.	Port Arthur	203	411
Downey, L.	Chapleau	177	469, 492
Drew, T. F.	Michipicoton	294	326, 330, 493
Driver, J.	S. S. Marie	194	380
Dudley, H. D.	S. S. Marie, Mich.	155	311
Dunn, C. B.	Paterson, N. J.	181	59, 436
Dycie, J. G.	S. S. Marie	131	373
Dycie, Margie.	Michipicoton	303	490
Earl, J.	S. S. Marie, Mich.	172	359
Eccles, G. H.	"	236a	100
Edey, M. C.	Ottawa	227	*46, 244
Edey, R. W.	Pontiac Co., Quebec	229	241, 245, 468, 475
Everett, H. L.	Philadelphia, Pa.	262	450, 454, 455, 471
Ganley, Jos.	S. S. Marie	268	137, 156
Ganley, T.	"	269	155
Garlick, R. M.	Youngstown, Ohio	443	233
Gaudette, C.	S. S. Marie	151	299, 355
Georgia, J.	New York	206	
Gilmore, D. B.	Toledo, Ohio	149	275, 346, 473
Gilmore, S. M.	"	263	199, 465
Gilmore, W.	"	164	332
Godon, T.	Missanabie	168	353, 354
Goetz, A.	S. S. Marie, Mich.	209	33, 34, 36, 69
Goetz, Mrs. A.	"	210	31, 35
Goetz, P.	"	208	32
Graham, Mrs. A.	Bowling Green, Ohio	182	365
Grierson, W.	S. S. Marie	195	
G. N. M. E. & D. Co.	Toronto	135 }	38, 75, 103 ($\frac{2}{3}$ int. in each), 307, 449, 486
Grevell, A.	S. S. Marie	180	381
Halliday, J.	Chapleau	226	474
Hankey, J. L.	Bowling Green, Ohio	189	370
Hankey, J. R.	"	187	369
Harris, J. R.	Guelph	136	267
Harvey, A.	Chapleau	224	292, 314
Harvey, T. R.	S. S. Marie, Mich.	170	357
Hayner, E.	Ottawa	246	150, 243, 248
Hobson, A. B.	Flushing, Ohio	243	91, 452
Holbrook, H. B.	Watford	179	465

Name.	Residence.	License.	Claims.
Holman, M. H.	Kirkhoven, Minn.	142	271
Hopkins, Anna	Pleasantville, Penn.	153	72, 97
Hopkins, H. J.	Buffalo, N. Y.	271	99
Hunt, J.	Rydal Bank.	239	491
Husson, Jane	Guelph	150	
Husson, W.	"	290	202, 339
Hynan, J. W.	London	295	265, 489
Jelley, J.	Webbwood	288	335
Johns, I. H.	Kirkwood	133	306
Johnson, A.	Pembroke	144	168 ($\frac{1}{2}$ int.), 169 ($\frac{1}{2}$ int.), 266
Johnson, J. H.	S. S. Marie	221	26
Johnson, T.	"	220	27
Kearns, J. J.	Palmerston	249	81
Kimball, Hattie	S. S. Marie	251	383, 418
King, S. A.	Missanabie	201	399, 409
Kitely, H.	Toronto	254	446, 462
Kitely, T. A.	"	255	445
Labelle, J. E.	Buckingham, Que.	161	334, 407, 484
Lands Corp'n of Mich.	Toronto	253	464
Lauzon, A.	S. S. Marie	457	{ $\frac{1}{2}$ int. 38 and 75, $\frac{1}{2}$ in 103, 356, 408
Law, S.	Guelph	148	287, 341
Lawlor, J. H.	S. S. Marie	278	{ 432, 470, 38 and 75 $\frac{1}{2}$ int. 103 $\frac{1}{2}$ int.
Legge, C. H.	Gananoque	257	129 447, 453
Legge, J.	"	223	{ 128 ($\frac{1}{2}$ int.), 264 ($\frac{1}{2}$ int.) 269 ($\frac{1}{2}$ int.) 476
Lewis, A. E., jr.	Milford, Penn.	258	304, 427, 178
Lewis, F.	"	166	430
Lewis, G.	"	260	303, 482
Lewis, W. H.	Detour, Mich.	167	312, 318, 319, 414
Lincoln, J. C.	Bowling Green, Ohio	190	361
Manitou Mineral Co.	Niagara	219	431
Martin, H. G.	Goderich	250	52, 259
May, E.	St. Catharines	160	325, 480
Miller, L. B.	Cleveland, Ohio	264	
Millikin, W. H.	Bowling Green, Ohio	188	362
Mitchell, J.	Guelph	147	294, 340
Mitchell, Mary E.	"	448	256
Moran, D.	S. S. Marie, Mich.	293	190
Moran, P.	"	236b	71
Moran, Mrs. P.	"	237	70
Morrich, N. D.	"	171	358
Morrison, W. H.	Eau Claire, Wis.	158	
Mowat, J. A.	Guelph	449	257
Myers, J.	"	274	466
Myles, P.	Toronto	453	
McCaslin, J. J.	Pleasantville, Penn.	141	
McDonald, C. J.	Oscoda, Mich.	121	13
McDonald, M.	Gananoque	222	433
McDougall, W. H.	White River	454	
McElevey, P. H.	S. S. Marie, Mich.	436	237
McGregor, D.	"	215	439
McGillivray, W.	Ottawa	228	44, 246
McLaren, A.	Chapleau	225	290, 315
McRae, P. J.	Detour, Mich.	175	347, 456
McTavish, J.	S. S. Marie, Mich.	213	438
Noel, J.	Missanabie	416	317

Name.	Residence.	License.	Claim.
Osborne, C. S.	S. S. Marie, Mich.	240	437
Parks, G. F.	Wawa.	270	173, 328, 487
Partridge, E. T.	S. S. Marie, Mich.	146	263
Patterson, D. C.	S. S. Marie.	139	270
Perry, W. F.	Wawa.	451	121, 122 ($\frac{1}{2}$ int. in each.)
Pettet, R.	Tarantorus.	134	305, 388
Pratt, W.	Mellrue, Wis.	159	
Proper, Clara A.	Pleasantville, Penn.	156	457
Proper, W. J.	"	273	458, 459
Quigley, G. B.	Bowling Green, Ohio.	280	195, 363
Rains, H. D.	S. S. Marie, Mich.	214	440
Ranson, D. J.	"	284	111
Reed, G.	Michipicoton.	282	477
Reynolds, C.	Paterson, N. J.	266	160, 161
Reynolds, F. R.	"	267	479
Robinson, H. M.	Youngstown, Ohio.	439	234
Rogers, G. H.	Ottawa.	230	47, 240
Rohn, E. H.	Cleveland, Ohio.	276	481
Roth, Augusta.	"	132	260, 295
Roth, F.	"	285	252 ($\frac{1}{2}$ int.)
Rush, R.	S. S. Marie.	128	336, 386
Sampson, W. J.	Youngstown, Ohio.	442	232
Sanders, E. H.	Watford.	178	
Sayer, H.	S. S. Marie.	281	277
Sayer, J.	Garden River.	217	308, 429
Schuttpelz, H.	Olmstead Falls, Ohio.	238	253 ($\frac{1}{2}$ int.) 272
Sherman, W. M.	Milwaukee, Wis.	241	442
Sleeman, G.	Guelph.	123	16
Soulier, A.	Missanabie.	212	426
Stambaugh, D. B.	Youngstown, Ohio.	440	239
Stambaugh, H. H.	"	438	235
Stambaugh, J.	"	441	231
Steele, R. C.	"	126	
Stewart, J.	Pembroke.	129	168 ($\frac{1}{2}$ int.), 169 ($\frac{1}{2}$ int.) 254
Sullivan, J.	S. S. Marie.	193	372
Supe, O.	S. S. Marie, Mich.	233	441
Superior G. & C. Co.	Toronto.	256	461, 463
Sutton, E. S. B.	S. S. Marie, Mich.	216	435
Thibault, N.	S. S. Marie.	138	337
Tisdale, D.	Simcoe.	234	189
Tisdale, W. E.	"	299	207, 483
Todd, G.	Youngstown, Ohio.	437	236
Trembley, J.	Toledo, Ohio.	272	49, 403, 404
Vansickle, W. B.	Lynden.	137	301, 302
Wallace, J.	S. S. Marie.	165	309, 451
Ward, L. M.	Pleasantville, Penn.	218	98, 378, 443
Ward, Myrtle.	"	252	460
Ward, W.	"	157	281, 391, 448
Wardell, C.	S. S. Marie.	192	384
Wardman, P.	S. S. Marie, Mich.	292	191
Wawa Gold Mfg. Co., Ltd.	"	298	92, 93, 94, 95
Westcott, T. J.	S. S. Marie.	176	352, 467
Wheeler, Dwight.	Bridgeport, Conn.	289	121, 122 ($\frac{1}{2}$ int. in each.)
Wheeler, D. C.	"	301	121, 122 ($\frac{1}{2}$ int. in each.)
Wick, H.	Cleveland, Ohio.	127	
Wight, J.	S. S. Marie.	287	226
Wilfing, F. J.	S. S. Marie, Mich.	259	102
Williams, J. B.	Michipicoton.	283	
Wilson, W. J.	S. S. Marie.	207	444
Wylie, W. H.	Niagara.	456	322, 374, 376, 417

NICKEL EXTRACTION BY THE MOND PROCESS¹

By Sir William Chandler Roberts-Austen

The rules of the Institution provide that an Associate shall submit a Paper within a year of his election. In complying with

Original character of this direction, the Author was satisfied that no better subject could be selected for consideration than the interesting process which marks an entirely new departure, in metallurgical practice, from the principles which have hitherto guided it. This process depends on the remarkable property possessed by nickel of forming a volatile compound with carbonic oxide, or, as it is called in modern chemical nomenclature, carbon-monoxide. When this gaseous compound is heated to 180° C. nickel is released in the metallic form.

The Sudbury Ore.

The Author was much impressed during a recent visit to Canada with the Imperial importance of the great nickeliferous district of Sudbury, Ontario.

In view of the magnitude of this deposit, the annual production of metallic nickel in Canada seems inadequate, as it has hitherto not exceeded 2,750 tons. The description therefore of any new process which affords a hope of hastening the development of this remarkable district should prove to be interesting. The deposit itself presents many points of interest. According to Professor Coleman of Toronto, the nickel ores of Ontario resemble the gold ores of Rossland in British Columbia, as they consist of a mixture of pyrrhotite (mag-

netic pyrites) and copper pyrites. These sulphides form enormous masses near the margin of large areas of diorite, or weathered gabbro of Huronian age, the amount of nickel contained in the ore averaging between 2½ per cent. and 10 per cent., the lower proportion being the more common. It is worthy of note that pyrrhotine from other parts of the country, found in association with Laurentian rocks, is almost barren of nickel. The importance of the nickel deposits of Ontario may be judged from the fact that, until the mines in the Sudbury region were worked, the world's supply of the metal was drawn chiefly from the mines of New Caledonia, an island in the Southern Pacific, supplemented by the Gap mine in Pennsylvania, and a few isolated mines in Norway and Hungary. The extent of the Sudbury deposits is greater than any of these, and New Caledonia, which belongs to France, is virtually the only rival of Ontario in the production of nickel.

The ore at Sudbury is smelted into a regulus, or matte, which contains between 12 per cent. and 20 per cent. of nickel, and about the same amount of copper, although usually there is rather more copper than nickel. This matte may be enriched by suitable treatment, and is "Bessemerized" into a regulus which contains about 40 per cent. of nickel, and is specially free from iron, as the following analyses show :

Analyses of Bessemer Matte Unroasted.

	I.	II.
	Per cent.	Per cent.
Nickel - - - -	40.938	31.35
Copper - - - -	45.714	48.86
Iron and (Al ₂ O ₃) - - -	0.405	0.81
Cobalt - - - -	0.136	....
Sulphur - - - -	11.960	....

¹ This paper on the Mond Process by Sir. W.C. Roberts-Austen, D.C.L., F.R.S., was read before the Institution of Civil Engineers, London, England, on 8th November, 1898. It is printed in this Report of the Bureau of Mines, with the permission of the Author, as a paper which describes from the scientific point of view a most interesting process, that it is hoped may ere long be utilized in the treatment of Ontario nickel ores.

It is unnecessary to give a history of the metallurgy of nickel, but it may be well to state

that Chronstet isolated the metal in the year 1751, and that Bergman confirmed his discovery in 1774.

The methods hitherto employed for extracting the metal from its ores are very complicated; they have involved concentrating the nickel either as a sulphide (matte or regulus), or as arsenide (speise) followed by either "dry" or "wet" treatment. In the case of certain ores, wet methods only have been employed. The metallic nickel has always to be subjected to a process of refining, mainly, as in the case of cast iron, with a view to separate it from associated carbon.

History of the Mond Process.

As regards the process which forms the subject of this Paper a few brief historical details may be offered. In 1889

Dr. Ludwig Mond, F. R. S., in collaboration with Dr. Carl Langer, was engaged in working out a method for eliminating the carbon-monoxide from gases containing hydrogen¹ which they wanted for use in their gas battery.² In attempting to effect this, they were guided by the observation they had previously made that finely divided nickel has the remarkable property of removing carbon from carbon-monoxide at a temperature of 350° C., converting it into carbon-dioxide, while the dissociation of carbon monoxide by heat alone, according to Victor Meyer and Carl Langer, remains incomplete at the high temperature of 1,690° C. In the course of these experiments, which they carried out in conjunction with Dr. Friedrich Quinke,³ finely divided nickel formed by reducing nickel oxide at 350° C., by hydrogen, was treated with pure carbon-monoxide in a glass tube at varying temperatures. In order to keep the poisonous carbon-monoxide out of the atmosphere of the laboratory the gas escaping from the apparatus was ignited. They found to their surprise that while the tube containing the nickel was cooling, the flame of the escaping gas became luminous and increased in luminosity as the temperature sank below 100°

C. Metallic spots were, moreover, deposited on a cold plate of porcelain held in this luminous flame, just as spots of arsenic are obtained in applying the Marsh test for that metal. It was also observed that on heating the tube through which the gas was escaping, a metallic mirror was obtained, while the luminosity of the flame disappeared. On examination these metallic deposits were found to be pure nickel. The next step was to endeavour to isolate this curious and interesting nickeliferous compound, by preparing nickel with great care at the lowest possible temperature, and treating it with carbon-monoxide at about 50° C. The amount of the volatile nickel compound in the gases passing through the apparatus was thus gradually increased. The gases issuing from the apparatus were treated with a solution of cuprous chloride to absorb the excess of carbon-monoxide, and in this way a residue of several cubic centimetres of a colourless gas was obtained, containing the volatile nickel compound. By passing this gas through a heated tube the nickel and carbon-monoxide were again separated, and the volume of the carbon-monoxide thus set free was found to correspond to about four equivalents of carbon-monoxide to one equivalent of nickel. By further improving the method of preparing the finely divided nickel, and by passing the resulting gases through a refrigerator cooled by snow and salt, the investigators at last succeeded in obtaining the new compound in a liquid state, and were able to produce it with facility in any desired quantity.

Metallic Carbonyls.

Nickel carbonyl in its pure state is a colourless liquid boiling at 43° C.; it has a specific gravity of 1.3185 at 17° C., and solidifies at -25° C. into needle-shaped crystals. It is soluble in alcohol, petroleum and chloroform; and it

Combining
with Nickel
and Iron.

¹ Ludwig Mond and C. Langer. "Improvements in obtaining Hydrogen," British Patent No. 12,608, 1888.

² Ludwig Mond and C. Langer. "A new form of gas battery." *Proceedings of the Royal Society*, vol. xlv. p. 296.

³ Ludwig Mond, C. Langer, and F. Quinke. *Journal of the Chemical Society*, vol. lvi. p. 749.

is not acted upon by dilute acids or alkalis. It can be readily distilled without decomposition, but on heating the vapour to 150° C., it is completely dissociated into its components, pure carbon-monoxide being obtained, while the nickel is deposited in a dense metallic film upon the sides of the vessel in which the compound is heated.

After the production of nickel carbonyl had become easy, Drs. Mond, Langer, and Quincke directed their attention to the action of carbon-monoxide on other metals. A series of experiments was made with a view to obtain a similar compound with cobalt, which in its chemical and physical behaviour so much resembles nickel. The experiments gave, however, the unexpected result that, unlike nickel, cobalt will not combine with carbon-monoxide. Experiments were then made with iron, and indications were soon obtained of the existence of a volatile compound of iron and carbon-monoxide; a long time elapsed before this new compound was obtained in a pure state. It was finally isolated in a way similar to that by which the nickel carbonyl had been prepared, and proved to be a somewhat viscous liquid of pale yellow colour.⁴ Its specific gravity at 18° C. is 1.4664; and it distils completely without decomposition at 102.8° C. under a pressure of 749 millimetres of mercury. When cooled to -21° C. it solidifies into a mass of yellowish needle-shaped crystals. Its chemical composition is somewhat different from the nickel carbonyl, as it contains five equivalents of carbon-monoxide to one of iron. The liquid compound, to which the name of iron penta-carbonyl was given, undergoes no change when protected from the action of light, but exposure to daylight for several hours in a sealed tube is attended with the formation of gold-coloured, tabular crystals, and carbon-monoxide is evolved, so that the pressure in the tube rises considerably. The crystals have, when dried, a metallic lustre, and resemble flakes of gold; they contain two equivalents of iron to seven equivalents of carbon-monoxide.

None of the other metals which were submitted to investigation showed indications of combining directly with carbon-monoxide.

The discovery that in a mixture of metals only nickel and iron would form volatile com-

pounds with carbon-monoxide, and that they could, therefore, be separated from the other metals, was sufficiently important to induce Dr. Mond to

arrange laboratory experiments with ores containing nickel, cobalt, iron, copper, etc., such as "kupfer-nickel" and "pyrrhotite." The experiments afforded such promising results that apparatus of considerable size, though still well within the limits of the resources of a laboratory, was set up, and in it several pounds of ore could be treated with carbon-monoxide.⁵ A patent was also applied for on the 12th August, 1890, which describes the way in which such ores may be treated. It is pointed out that the principal nickel ores which are metallurgically treated contain the nickel in combination with arsenic and sulphur besides other metals and gangue. These ores have first to be submitted to the process of calcination, in order that the nickel may be present in the form of oxide, and to drive off, as far as is practicable, the arsenic, sulphur, and other volatile bodies. The resulting oxide of nickel is treated with reducing gases, such as water-gas or producer-gas, in order to convert the oxide of nickel into finely divided metallic nickel; the material containing it then is cooled to about 50° C., and is treated with carbon-monoxide. In dealing with nickel ores which contain nickel oxide in chemical combination with silicic acid, arsenic acid, or other substances which cannot be removed by calcination, the ores are so treated as to convert the nickel into nickel speise or nickel matte, which is then subjected to calcination.

The Smethwick Plant.

In 1892 an experimental plant on a large scale was erected at Smethwick, near Birmingham. After some years of patient work, during which the plant had several times to

⁴ Ludwig Mond and Carl Langer on "Iron Carbonyls." *Journal of the Chemical Society*, vol. lix, p. 1090.

⁵ Ludwig Mond on "Metallic Carbonyls." *Proceedings of the Royal Institution*, vol. xiii, p. 668.

be reconstructed, in order to meet all the conditions of this somewhat delicate process, the plant gradually assumed the shape shown in Figs. 1, Plate 1. Before describing it in detail it will be well to give a brief account of the operations involved in the process, which are the outcome of many years of practical experience.

The process is more especially suitable for the extraction of nickel from ores which contain copper in addition to nickel

Operations
involved in
the Process.

and iron. These ores, which have on an average between 2 per cent.

and 6 per cent. of nickel and about the same amount of copper, are first subjected to "heap roasting," to eliminate the greater part of the sulphur, and to convert the iron which forms their chief constituent into oxide. The roasting is necessary to enable the iron in the following operation of smelting to combine with the silica present in the ore to form a slag, and thus to effect the separation of the iron from the nickel and copper which unite with the remainder of the sulphur to form a regulus or matte. This matte contains the nickel and copper in a more concentrated form, the amount of each metal being usually 15 per cent. to 20 per cent., the residue consisting mainly of sulphur and iron. To concentrate the nickel and copper still further, the matte is "bessemerized." A sample of such "bessemerized" matte is exhibited; it contains 31.37 per cent. of nickel, 48.62 per cent. of copper and 0.70 per cent. of iron. It was prepared by the Canadian Copper Company, Sudbury, Ontario, from their ores, which contain an average of 4 per cent. of nickel and 4 per cent. of copper. This "bessemerized" matte is crushed, ground, and subjected to a calcining operation so as to convert the sulphides into oxides, and it is then passed through a mill and dresser. This calcined Bessemer matte then consists practically of nickel oxide and copper oxide in varying quantities. It has been found in the practical working of the process to be advantageous to further concentrate the nickel by extracting part of the copper at this stage by treating the mixtures of oxides with dilute sulphuric acid, which dissolves about two-fifths of the copper present without taking

up more than 1 per cent. to 2 per cent. of the nickel. The copper thus dissolved is in the form of copper sulphate and is obtained in a marketable form by crystallization. The undissolved residue from this operation contains between 45 per cent. and 60 per cent. of nickel, and after drying it is subjected to a carefully regulated reducing process by means of water-gas, after which it is treated with carbon-monoxide to extract part of the nickel present. In this first treatment with carbon-monoxide about two-thirds of the nickel can be easily extracted; after this amount is volatilized the extraction becomes much slower, so that it has been found advantageous to recalcine the residues and repeat the copper extraction, the reduction, and the nickel extraction.

The five operations involved are diagrammatically illustrated in Fig. 2. The process

begins, as will be seen, at one end with the material to be treated,

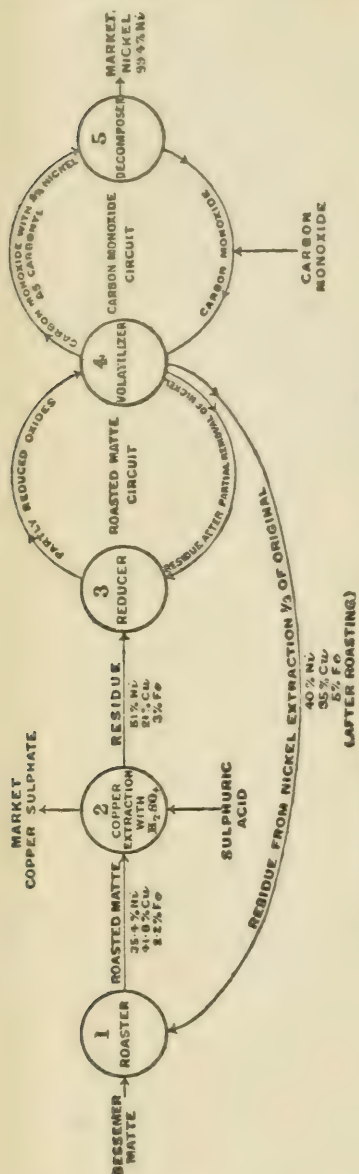
Details of
the Opera-
tions.

"bessemerized" matte; it ends with the market product nickel. The "bessemerized" matte proceeds, as the arrow indicates, to the first operation (1) of dead roasting, and for this purpose any suitable furnace may be employed. After roasting, the matte contains 35 per cent. of nickel, 42 per cent. of copper, and about 2 per cent. of iron.⁶ It then passes to the second operation (2) for the extraction of part of the copper (about two-thirds) by sulphuric acid, the copper being sold as crystallized sulphate of copper. The residue from this process contains about 51 per cent. of nickel and 21 per cent. of copper, and passes to the third operation (3) for reducing the nickel and incidentally the remaining copper, to the metallic state, care being taken to avoid reducing the iron. This is effected in a tower provided with shelves, over which mechanical rabbles pass, the reducing agent being the hydrogen contained in water-gas. The temperature does not exceed 300° C., and should be kept lower when much iron is present. From this tower the ore is conveyed continuously to the fourth operation

⁶ Average results are given in the Figure, rather than the best which have been obtained.

(4) of volatilization, in which part of the nickel is taken away by carbon-monoxide and forms the compound nickel carbonyl.

(3), and it continues to circulate between stages (3) and (4) for a period varying between 7 days and 15 days, until about 60 per cent. of the nickel has been removed as nickel carbonyl. The residue from this operation, amounting to about one-third of the original calcined matte, and not differing much from it in composition, is returned to the first operation and then naturally follows the same course as before. The nickel carbonyl, produced in the fourth operation, passes to the decomposer (5). This appliance is either a tower or a horizontal retort, which is heated to a temperature of $180^{\circ}\text{C}.$, so as to decompose the nickel carbonyl and release the nickel in the metallic form, either on thin sheets of iron or, preferably, on granules of ordinary commercial nickel. Carbon-monoxide is also released, and is returned to the volatilizer to take up a fresh charge of nickel. It will be evident that, when the operation is in progress, the gaseous carbon-monoxide and the partially reduced oxides of nickel and copper are continuously revolving in two separate circuits which join and cross each other in the volatilizer (4). The commercial product contains between 99.4 per cent. and 99.8 per cent. of nickel.



Description of the Working.

It will now be possible to proceed to a description of the working as the Author saw it in full operation in Smethwick a

Subsidiary Ore under Treatment. The details are clearly indicated in the plan of the works, Figures 1, Plate 1 (p. 112). The material under treatment during the Author's visit was of Canadian origin, and had been received as calcined Bessemer matte containing 35.4 per cent. of nickel, 41.8 per cent. of copper, and about 2 per cent. of iron. This material was first passed through a ball mill and dresser with a sixty-mesh riddle, and was then treated in quantities of 3 cwt. in a small lad-lined mixer with 200 lb. of ordinary sulphuric acid, which had previously been diluted with about 20 cubic feet of mother liquor from previous operations. These appliances are shown in the right hand portion of the plan and elevation, Figures 1. The

The formation of this volatile compound is effected in a tower similar to the reducing tower, but the temperature is much lower, and does not exceed $100^{\circ}\text{C}.$ From the volatilizer, the ore is returned to the reducer

temperature of the mixture soon rises by the action between the copper oxide and the sulphuric acid, and is kept, by means of a steam-jet, at a temperature of about 85°C . for $\frac{1}{2}$ hour. From this mixer, the charge is run out into a centrifugal hydro-extractor, provided with a filtering cloth, in which the solution of copper sulphate is separated from the solid residue containing the nickel. After the filtration of the charge is finished, the speed of the hydro-extractor is increased, and the residue is thus rendered sufficiently free from the liquor.

The solution containing the extracted copper runs from the hydro-extractor into a well, from which it is pumped into the crystallizing vats shown in the Figures. After a period of about eight days to 10 days, the crystals of copper sulphate are taken out of the vats and the mother liquor is mixed with fresh acid and is again used for the extraction of copper. As already mentioned, a small amount of nickel and a little iron are also dissolved in the sulphuric acid during the copper extraction, so that the mother liquor from which the copper sulphate has crystallized becomes gradually contaminated with these two metals. It is therefore necessary to replace some of the mother liquor from time to time by fresh water, and to recover the nickel from the solution. The simplest method is to evaporate the solution to dryness and to roast the nickel and copper sulphates so obtained. The oxidized material is again introduced into the main process. The copper sulphate crystals from the crystallizing vats are charged into a second hydro-extractor, where they are washed with a little clean water to remove all acidity; they are then dried and are ready for packing. The copper sulphate thus obtained is sufficiently pure for the market, as it contains only 0.05 per cent. of nickel and 0.048 per cent. of iron.

The residue from the copper extraction is taken from the hydro-extractor and stored in a bin until a sufficient quantity has been collected to make up a charge of five tons to six tons for the nickel-extracting plant. It now contains 52.5 per cent. of nickel, 20.6 per cent. of copper, and

2.6 per cent. of iron. The material is charged by hand at the rate of $\frac{1}{2}$ ton per hour into a feeding-hopper, described as the matte inlet in the lower part of the plan, Figures 1, Plate 1, which communicates, through a rotary valve, with the conveyor, consisting of a tube enclosing a revolving spiral, which transports the material to an elevator. This lifts the material to the top of the reducing tower, and discharges it through another rotary valve into this reducing tower.

The reducer and the volatilizer (shown in the centre of Figures 1) in which the treatment with carbon-monoxide takes place, are fully described in Dr. Mond's patent (No. 23,665 of December 10th, 1895). The reducer consists of a vertical tower about 25 feet high, containing a series of shelves, which are hollow so as to admit of their being raised to a temperature of 250°C . by producer gas. The roasted matte falling on these shelves from above is stirred and made to descend from one shelf to that below it by rabblies actuated by a central vertical shaft. Water-gas passes up the tower to effect the reduction of the material. There are about fourteen of these shelves or trays in the tower. The five lower shelves are not heated by producer gas, but are cooled by a stream of water in order to reduce the temperature of the roasted and reduced matte to the temperature at which the volatilizer is worked.

The volatilizing tower resembles the reducer, but the shelves are not hollow, as there is no necessity to heat them. The reduced nickel requires a temperature of only 50°C . to enable it to combine with carbon monoxide and form a volatile compound, and the matte and gas are sufficiently hot to maintain this temperature. In the plant at Smethwick the volatilizer was made the same size as the reducer, but in the new plant it is somewhat smaller.

The decomposer has been devised with much care, and has, in its present form, only recently been patented. The nickel is deposited in it, from its gaseous compound with carbon monoxide, on granules of ordinary commercial metal. The arrangements by which this is effected are very in-

genious, and may be described almost in the words of Dr. Mond's late patent. The object is to obtain metallic nickel from nickel carbonyl in the form of pellets, which are specially suitable for the production of nickel alloys. For this purpose gases containing nickel carbonyl are passed through granulated nickel, which is kept at the temperature required for the decomposition of the carbonyl—about 200°C . The nickel which thus separates from the carbonyl becomes deposited on the granulated nickel, which consequently increases in size. In order to prevent cohesion of the granulated nickel, it is kept in motion. When a number of the pellets have attained a convenient size, they are separated by sifting without interrupting the depositing operation, the smaller granules being returned to receive a further deposit from the nickel carbonyl. A convenient form of apparatus for effecting the process described is shown in Figures 3, which represent vertical sections of the apparatus on planes at right angles to each other. A is a cylindrical vessel, preferably built up of short cylinders, *a a*, bolted together; it contains a central tube, C, provided with gas outlet holes, O, through which the gas containing nickel carbonyl, entering at the gas inlet, B, passes into the vessel which is filled with shot, or small granules, of nickel. The gas permeates through the interstices between these granules, and is brought into intimate contact with them, and when the nickel carbonyl is decomposed the nickel is deposited on the granules. The gases finally escape through the outlets, L, into the gas-exit pipe, M. In order to prevent the granules from cohering, they are kept slowly moving by continuously withdrawing some of the granules from the bottom of the cylindrical vessel, A, by means of a right and left-handed worm conveyor, U, which delivers the granules into two sifting-drums, N. The smaller granules fall on to the inclined plane, W, and collect at the base of the elevator, E, which conveys them again to the top of the cylinder, A, and feeds them through the feeding hole, X. In order to avoid the deposition of nickel from the nickel carbonyl in the central tube, C, it is kept cool by causing water to circulate down the tube,

F, and up through passages F^1 , formed in the central tube, to the water outlet, F^2 . The cylindrical vessel, A, is surrounded by a

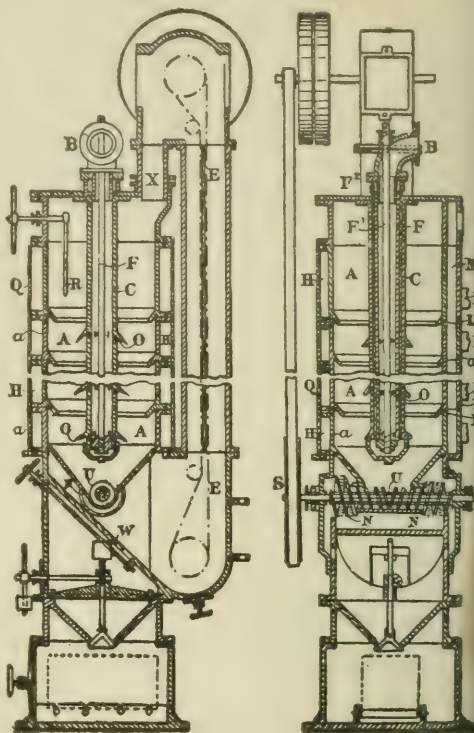
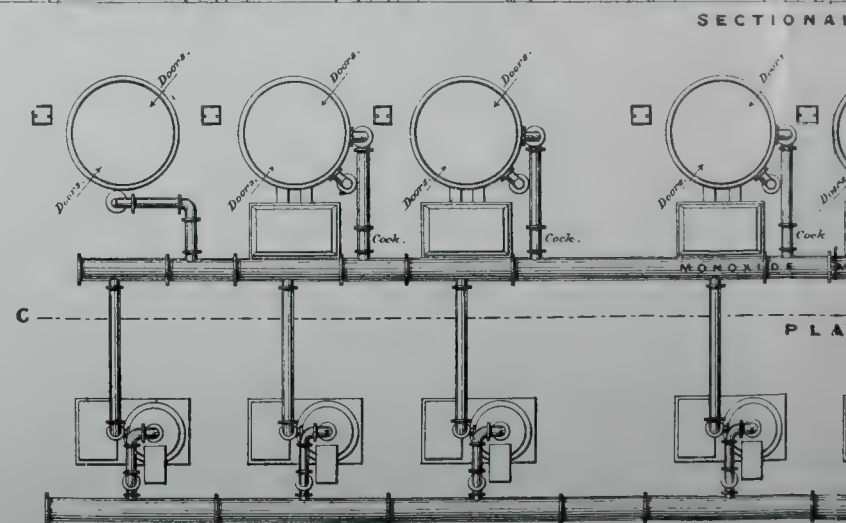
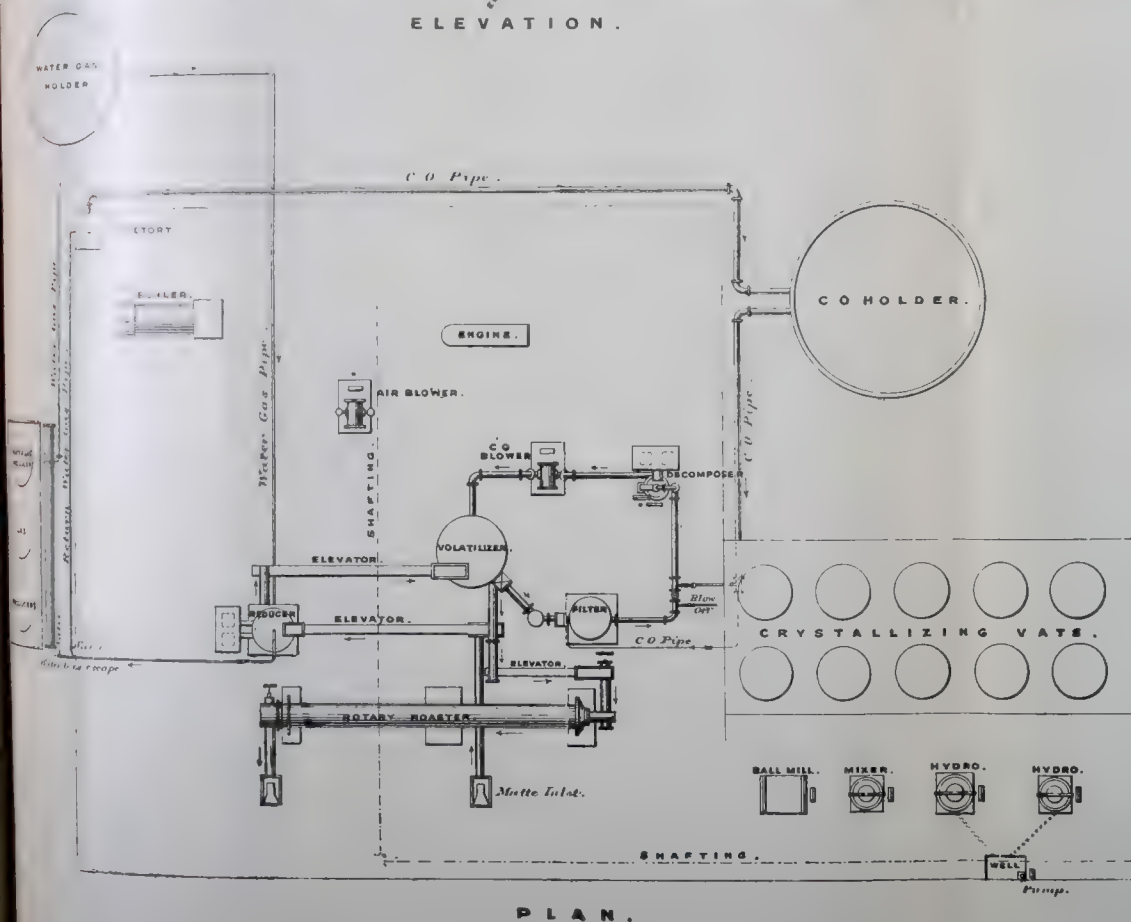


FIG. 3. VERTICAL SECTIONS THROUGH THE DECOMPOSER.

wrought-iron casing Q, which forms heating-spaces, H, communicating with heating-flues, P, which are so arranged that the temperature of each cylinder can be separately regulated by dampers, so as to maintain the temperature of the granules of nickel contained in the vessel, A, at about 200°C , at which temperature the nickel carbonyl is decomposed. With a view to ascertain whether the cylinder, A, is full of granules, a rod, R, is fixed to the spindle of an external handle, which can be turned partly round, so that if the operator feels resistance to the motion of the R, it is certain that the granules extend to that height. The appliance used for depositing the nickel originally consisted of a series of retorts lined with thin steel sheets, on which the nickel was deposited in layers. It was found, however, that the metal so obtained was very difficult to cut, and the appa-

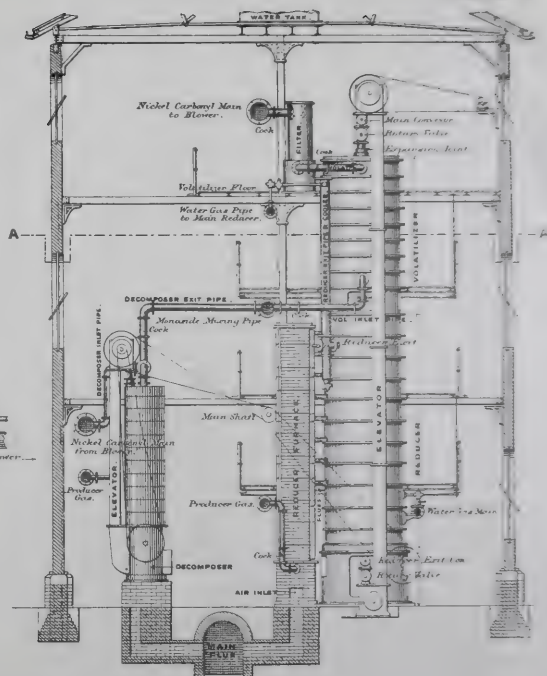
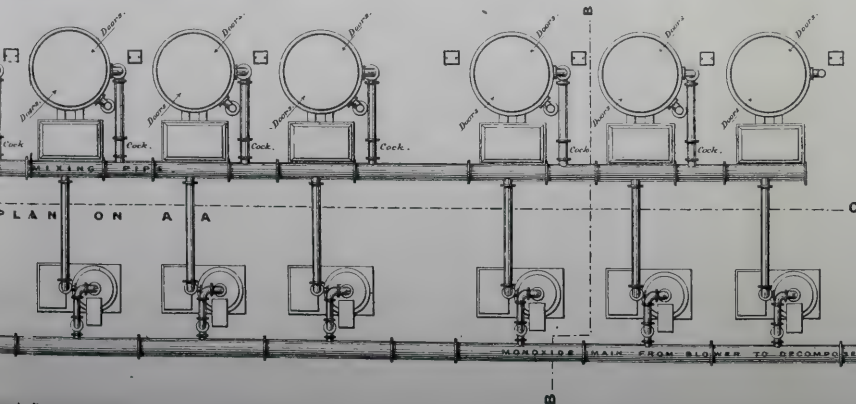
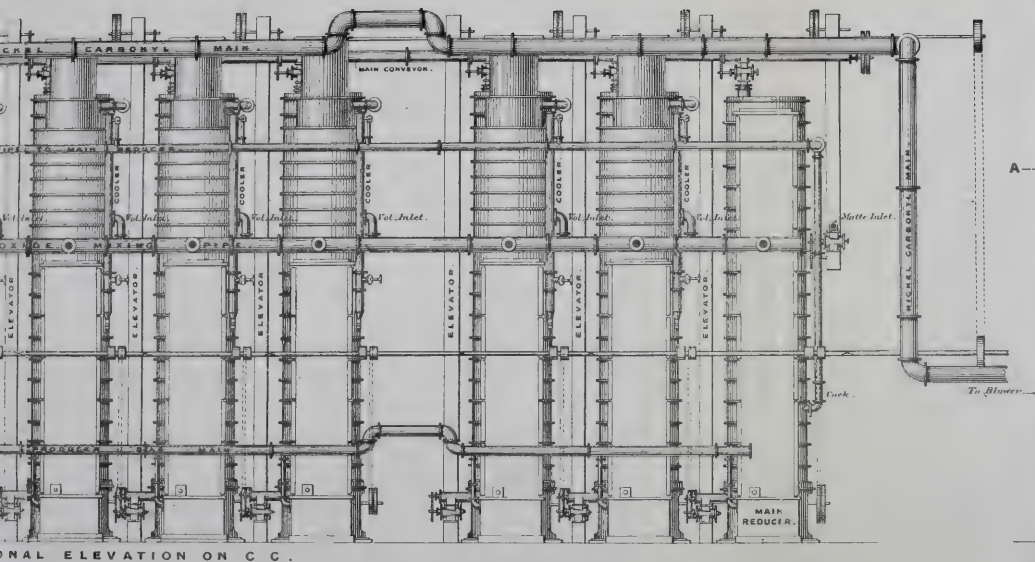
EXTRACTION OF



FIGURES 1 AND 5, TO ILLUSTRATE PROF. ROBERTS-AUSTEN'S PAPER ON MOND'S P

OF NICKEL.

Fig^s 5



CROSS SECTION ON B B.

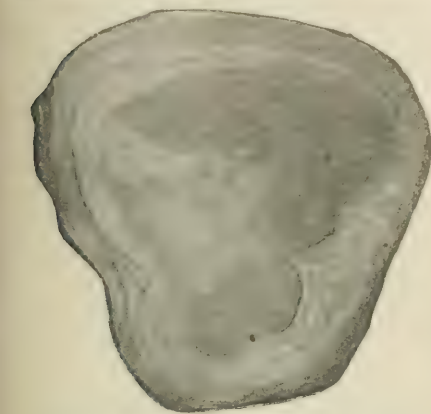
SCALES

Scale for Fig^s 1, 1 Inch = 20 Feet.

Scale for Fig^s 5, $\frac{3}{4}$ Inch = 1 Foot.

ratus above described was accordingly devised.

A magnified section of a granule of nickel, which was about $\frac{3}{4}$ inch in diameter, is shown in Figure 4. It will be seen that there is a core of nickel which under higher magnification shows a crystalline and convoluted structure, and this core is surrounded by concentric layers. The central core is ordinary commercial nickel, and



4. PHOTO-MICROGRAPH OF A GRANULE OF NICKEL
MAGNIFIED THREE DIAMETERS.

the layers are nickel deposited from its carbonyl. In some cases granules of deposited nickel are found without any central core. these have grown from minute fragments of deposited nickel which have become detached during the course of deposition.

The water-gas used in the reducer is generated in gas-producers, three of which are shown on the left of the plan, Figure 1, Plate 1. Anthracite is used to decompose the steam, and the water-gas is collected in a gas-holder, whence it is taken to the reducing tower, to which reference has just been made. This gas contains, on entering the reducer, about 60 per cent. of hydrogen.

The reducing operation is so regulated that only a small quantity of hydrogen remains in the escaping gas, as a rule not more than 5 per cent. to 10 per cent. This waste gas is subjected to the action of a fine water-spray (not shown in the Figure), which condenses the steam generated by the combustion of the hydrogen in the water-gas. Part of this waste gas is used for making the carbon-

monoxide required in the volatilizer, by passing it through the CO retort charged with incandescent charcoal, Figure 1, which reduces the carbon-dioxide contained in the waste gas, and this increases the amount of carbon-monoxide in it. The gas issuing from this retort contains about 80 per cent. of carbon-monoxide, and is stored in another gasholder, which communicates with the main circuit of the carbon-monoxide gas. The main circuit of the carbon-monoxide passes through the volatilizer already referred to, where the nickel is taken up. The carbon-monoxide, now charged with nickel, passes through a filter to separate the fine particles of matte-dust from the gasses, then through an apparatus called the decomposer, and so described in the Figure. In this decomposer the nickel taken up in the volatilizer is deposited. The gas now deprived of its nickel passes to the CO blower, Figures 1, which sends the carbon-monoxide to the volatilizer in order that it may take up a fresh charge of nickel.

The solid material from which the nickel is being extracted is kept circulating through the reducer and volatilizer for a period varying between seven days and 15 days, during which time the oxides are gradually reduced to the metallic state and the nickel volatilized. When the material originally charged in has had the bulk of its nickel extracted it is run out through a rotary calciner roaster, Figures 1, which converts the metals into oxides, so that they may be treated for the second time with sulphuric acid and carbon-monoxide. The ratio between the nickel and copper in the residues from the nickel extraction is practically the same as in the calcined Bessemer matte, with which the operations were started, but the amount of iron has increased by the removal of the copper and nickel, as the following figures show:—Original matte contains, nickel, 35.27 per cent., copper, 41.87 per cent., iron, 2.13 per cent. After the first treatment of copper and nickel extraction, the quantities are, nickel, 35.48 per cent., copper, 38.63 per cent., iron, 4.58 per cent.; and after the second copper and nickel extraction, nickel, 35.83 per cent., copper, 35.56 per cent., and iron, 7.82 per cent. The amount of nickel

extracted in these two cases was, after the first treatment 61 per cent., and after the second treatment 80 per cent. of the nickel present in the original matte. It must be remembered, however, that in the second treatment only one-third of the original amount remains to be treated, while the final residue is only one-tenth. To avoid the formation of iron carbonyl, the temperature in the reducer has to be kept very low, and if this is done, the nickel extracted from a matte originally containing as much as between six per cent. and ten per cent. of iron will not contain more than 0.5 per cent. of iron. If the amount of iron in the residues rises above this percentage, the extraction of the nickel is very much delayed, on account of the low temperature which must be maintained in the reducer. It is necessary, in such a case, to re-smelt the residues before proceeding with the extraction of the nickel and copper. The following are analyses of the deposited nickel :

—	I.	II.
	Per cent.	Per cent.
Nickel	99.82	99.43
Iron and (Al ₂ O ₃) ..	0.10	0.43
Sulphur	0.0068	0.0099
Carbon	0.07	0.087
Insoluble residue...	....	0.026

The experimental plant at Smethwick has been working for some time, and about 80 tons of nickel have already been extracted in it from different kinds of matte. The results obtained were quite satisfactory, and they point to the conclusion that the process is fully able to compete with any other process at present in use for the production of metallic nickel.

A Commercial Plant.

By the kindness of Dr. Mond, the Author is able to exhibit plans for a large manufacturing plant, and Figures 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, show a vertical elevation, sectional plan and cross-section of it. This plant will, it is estimated,

produce 1,000 tons of nickel per year. The plant is so arranged that the matte is continuously charged into the first reducer and traverses the whole set of appliances. When the matte issues from the last volatilizer the first nickel extraction is finished. The matte is re-roasted and submitted to the second copper and nickel extraction. There are ten appliances, consisting of one large reducer, eight combined reducers and volatilizers, and one large volatilizer. They are so arranged that the matte has first to pass through the large reducer, and is then lifted, by means of an elevator and conveyor, into a volatilizer (erected on the top of the next reducer). The relative positions of the reducers and volatilizers are best shown in the cross-section, Figures 5. It passes through the volatilizer into the upper portion of the reducer and in traversing this it is further reduced. It is then lifted again to the next volatilizer, and so on till it finally reaches the larger volatilizer at the end of the whole series, and, after passing through this, it is discharged into the roasting furnace. The conveyor on the top of the volatilizers, into which the elevators discharge, is common to the whole set of volatilizers and reducers, so that, in case any portion of the plant has to be disconnected, the rotary valve through which the material is discharged from the conveyor into the volatilizer is stopped. The material then passes on through the conveyor into the next volatilizer. The two gases, carbon-monoxide in the volatilizers and water-gas in the reducers, are kept separate by rotary valves of the same construction as in the small plant. The water-gas connections are so arranged that each reducer receives fresh gas from the main, with the exception of the first large reducer, through which the waste gas of all the other reducers is passed, so as to burn completely all the hydrogen in the water-gas. The carbon-monoxide passes through the volatilizers from a common main, and is collected, after it has passed through the filters, in a main leading to the blower. From the blower the carbon-monoxide charged with nickel passes through a set of decomposers, and again into the main which feeds the volatilizers.

Value of the Process.

With regard to the application of steel containing between one per cent. and seven per cent. of nickel in constructive work, the Author need not remind members of the Institution of the importance of nickel steel not only for the manufacture of armour-plates but for all purposes where strength and lightness are essential. One manufacturer in the United States used in one year no less than 178 tons of nickel in the form of nickel steel, and it has been stated by a competent authority that "if propeller shafts were made of nickel steel the question of failures would seldom or never be raised." An attempt to deal adequately with the application of nickel would lead far beyond the scope of the present Paper, and the Author only adds that the extraordinary properties of these alloys have formed the subject of elaborate investigations by the late Dr. John Hopkinson⁷ and by Mr. Guillaume.⁸

The Author acknowledges his indebtedness to Dr. Mond and to Dr. Langer for enabling him to examine the Smethwick Works in detail and for the drawing they prepared for him of the plant. The Author's assistant, Dr. Stansfield, was by Dr. Mond's kindness able to watch every stage of the process during a prolonged visit to the works.

It will have been evident that the process possesses unusual interest as being the only one, in the whole range of metallurgy, in which a metal is obtained from its ores by causing it to combine with a gas to form a gaseous product from which it is subsequently released. Not the least remarkable feature of the process is presented by the fact that the temperature at which the whole operation is conducted never exceeds 300° C., which is far below dull redness. As a consequence, the plant, which may still admit of simplification, is not, as is usually the case with metallurgical appliances, subjected to

alterations of temperature extending through a considerable range. The repairs needed are therefore inconsiderable, and the amount of fuel required is but small. The process works more or less automatically, and the amount of labor involved in conducting it can be reduced within very narrow limits. The main operation is, moreover, a regenerative one; the carbon-monoxide moves in a cycle, and is the vehicle for continuously transferring the nickel from the ore or matte and converting it into a marketable form. It follows that in the extraction of the nickel no new material except the reducing agent, water-gas, has to be introduced into the system. This is true even of the granules of commercial nickel which fill the decomposer and serve as a basis for the deposition of the nickel from the carbonyl. Their presence is essential in starting the process; but their place is, as has already been pointed out, gradually taken by fragments of the deposited metal which becomes detached as the operation proceeds. The process will always occupy a prominent place in chemical history, and there would seem to be no reason why it should not play an important part in metallurgical practice.

As regards the application of the process in Canada, the Author trusts that this attempt to make it better known may contribute to develop one of the resources of the great Dominion.

The Paper is accompanied by six drawings and a photo-micrograph, from which Plate 1 and the Figures in the text have been prepared.

Discussion of the Paper.

Mr. W. H. Preece, C.B., F.R.S., President, said it was his first duty to propose, and he was sure it would be carried with acclamation, a vote of thanks to the Author for the extremely clear and able way in which he had brought before the members a process that appeared to be new from beginning to end. It was one which they would watch with great interest and hope to have further light thrown upon. To many it was startling to think that nickel could be converted into a gaseous

President
Preece

⁷ Proceedings of the Royal Society, vol. xlvii. p. 23; vol. xlvii. p. 138; vol. xlviii. p. 1.

⁸ Comptes rendus, vol. cxxiv. pp. 176, 178 and 1515, and vol. cxxv. p. 235.

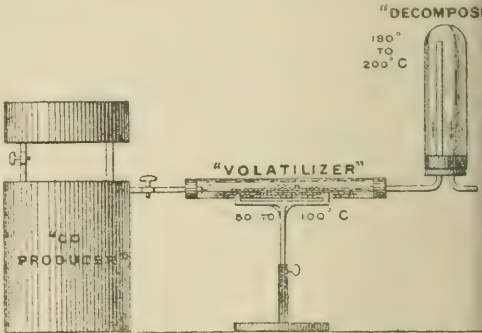
form, and from the gas the solid metal that was so much required extracted by moderate increase of temperature.

Prof. Roberts-Austen remarked that as the process was of such great interest to Canada, he might be permitted to read a telegram he had received from Lord Strathcona and Mount Royal, the High Commissioner for the Dominion: "I am exceedingly sorry that owing to a severe cold I am compelled to deny myself the pleasure of being with you this evening. Your address would have had great interest for me, seeing how important the nickel industry is to Canada. Please accept my sincere regrets." He would first call attention to the liquid carbonyl compounded of carbonic oxide and iron. A sample was exhibited, for which the Institution was indebted to the kindness of Dr. Mond, together with a sample of the fluid carbonyl of nickel; but it was so poisonous that he feared to leave it where the tube in which it was contained might become fractured. He desired to show the actual experiment upon which the whole beautiful process was based, but it was an exceedingly delicate one to bring from a laboratory and show in a room far away from the place in which it had been arranged. The gasholder contained carbonic oxide, and a little of the gas was ignited to show that it burnt with the characteristic flame of that gas. This gasholder, figure 6, corresponded with the carbonic oxide retort of Figures 1 and 2, Plate 1. The gas was then passed over finely divided metallic nickel at a temperature not necessarily exceeding 50°C ., and the luminosity of the flame was materially increased. The tube containing the nickel corresponded with the portion of the plant called "volatilizer" in Plate 1. In a very few minutes the carbonic monoxide took up its charge of nickel, and there was a luminous flame which deposited its nickel on any cold surface held over it. The flame was fully charged with nickel and deposited a black layer of the metal on a plate of cold porcelain. It could be seen within what a very small range of temperature the whole operation was conducted. By passing the gas into a tube, and by heating

it, a brilliant deposit of metallic nickel was obtained on the inside, in the form of a mirror. This tube corresponded with the "volatilizers" of the plant shown in Plate 1. The plate of solid nickel, which he exhibited, stripped off a sheet of iron on which it had been deposited, was prepared precisely as shown by the experiment, only in a large retort. He also exhibited granules of nickel having a core of ordinary commercial nickel. If the nickel carbonyl was introduced into an ordinary non-luminous Bunsen burner it instantly became luminous. Photographs were projected upon the screen to illustrate (1) the roasting bed of the great ore deposit

Prof.
Roberts-
Austen.

"DECOMPOSE" 180° TO 200°C



G. GASHOLDER, VOLATILIZER AND DECOMPOSER.

in the district near Sudbury; (2) a mass of nickeliferous regulus resulting from the process of heap roasting, showing on what a grand scale the operation was now conducted; (3) a magnified granule of ordinary commercial nickel surrounded by concentric layers of nickel, Figure 4. The central core was unduly large. In conducting the process on the large scale, no new granules had to be introduced into the system, because the fragments of the external layers became detached and so served as a basis for the deposition of fresh quantities of nickel from the carbonyl; (4) an enlarged view of a granule showing the crystalline structure of the ordinary commercial nickel, which contained carbon, while the banded layers were magnifications of the pure nickel deposited on the nucleus of commercial nickel; and (5) heating and cooling curves of metallic nickel registered by means of an autographic pyrometer. As the nickel attained a temperature of 600°C . there was a

distinct break showing absorption of heat; and conversely, as the metal cooled there was a slight elevation corresponding in position with that on the other side, which meant that as the metal cooled there had been true recalescence, exactly as in the case of iron. The points in the curve were not in any way due to carbon, but to the molecular change in the nickel itself. Another bond of union was thus demonstrated between metallic iron and metallic nickel, which in many ways resembled each other.

Electricity as a Refining Agent.

Dr. Ludwig Mond desired to express his gratitude to the Author for having introduced, in so lucid and eloquent a manner, his invention to the Institution. It had required very careful tending, but he thought it was now quite capable of taking care of itself in the struggle for independent existence among manufacturing processes. When the Author had first suggested that he should like to bring the subject before the Institution, Dr. Mond had some difficulty in seeing the connection between nickel extraction and the Institution of Civil Engineers; but having enjoyed the privilege of listening to the beautiful address delivered by the President a week before, he had learnt how many different kinds of engineers were admitted to the Institution; and he believed he had grasped why the Author was desirous to choose that particular subject for the Paper it had become his privilege and duty as an Associate to read. He hoped that the Paper, showing as it did the great engineering difficulties that had to be solved to carry out that apparently very simple process of manufacture, would have completely dispelled any doubts as to the position occupied by the chemical engineer in the great fraternity. In his remarkable address the President had made out a very strong case in favor of electricity becoming the exclusive handmaid of mankind, to minister to all its wants. He ventured to think that in future there would still be innumerable occasions on which chemical affinity would be called upon for assistance, and he believed the process described in the

Paper would be one of those cases where chemical affinity would successfully resist all attacks by electric currents. It would be noticed how delicate the action of chemical affinity was in that process, how it became completely reversed by slight increase of temperature and how carbonic oxide and nickel combined readily at 100°C. and fled asunder again at 180°C. That was the great beauty of the process and the great facility which it offered to attain the end in view.

Colonel James Baker, late Minister of Mining, British Columbia, was constrained to remark upon the immense importance the experiments that had been shown must have upon the mining interest of Canada generally. It was known that the nickel ores experimented upon by Dr. Mond had been all derived from the Sudbury district in Ontario. He was very anxious, if possible, to find the Province of British Columbia possessed of nickel ores somewhat similar to those of Sudbury, and he had issued instructions to the various mining recorders in different parts of the Province to send to the Government assayer all the ores they possessed, in order that they might be tested for nickel; but he regretted to say they had not yet succeeded in finding it in any marketable quantity. However, a large body of ore had recently been discovered in Vancouver island, similar to the ore which was, perhaps, familiar to some of the members present under the names of chalcopyrites, and somewhat similar to that at Rossland; but there was a difference, in that it contained a little more nickel and a considerable amount of gold. Therefore, he hoped that, by further experiments with ores in British Columbia, a quantity of nickel that might be of marketable value might yet be arrived at; if so, he was quite sure he might look forward to its being treated by the wonderful process which had been explained by the Author. It must be remembered that British Columbia was a young Province, and that the discovery of lode mines there was, comparatively speaking, of recent origin, and that it also took a considerable amount of time and capital to develop the mines. If the mines had not been brought to a remunerative basis more

Col. Baker,
of British
Columbia.

Dr. Ludwig
Mond, the
Inventor.

quickly it was because of the time and capital necessary for that process.

Mr. J. E. Stead observed that Dr. Mond's wonderful discovery had been known for some time to chemists, who had thought it impossible to make a practical process for the manufacture of nickel by it; but they also thought, at the same time, that if there was one man in the world who could do it, it was Dr. Mond himself. The process was a wonderful monument to Dr. Mond's chemical and engineering skill, for the elaboration and the skill which had been shown in the arrangement and the design of all the machinery to conduct the special process was very remarkable, and reflected enormous credit upon Dr. Mond and his fellow-workers. The Paper also reflected credit upon the Author for its great lucidity and clearness. Those who had studied the calcining of nickel ores would know the great difficulty of eliminating the sulphur, which seemed to be a great trouble in the present case. The sulphur adhered to the nickel very persistently, and the nickel must be in the state of oxide before it could combine with carbonic oxide; more information upon this point would therefore have been interesting. Again, after the first and second roasting processes, he should like to know why the copper and nickel remained in a definite ratio. Was some union formed between the nickel and copper? and why should the nickel refuse to give itself up in the presence of the particular quantity of copper referred to in the Paper? He thought the process a marvellous one to be conducted at such an extremely low temperature. It was certainly a new departure, first obtaining the metal in the form of gas at relatively an extremely low temperature and then depositing it at 200°C., below the melting point of tin. It was possible that for a time the process might be in the ordinary stage of infancy; but eventually, he hoped and believed, that, with Dr. Mond's skill and wonderful ingenuity, it would be, if it were not already, a practicable and valuable one for the manufacturer of nickel.

Mr. George Attwood had acted for some years as Consulting Engineer to the Dominion

Mineral Company, the next company in importance to the Canadian Copper Company, and had designed and constructed all their mining and smelting works. He agreed that the production of metallic nickel in the Sudbury district was disproportionate to the extent of its mineral deposits. The lack of a refining process that could be worked economically on the spot had been one of the chief reasons why the Sudbury nickel deposits had been neglected. The mining companies, after converting the ores into a matte or regulus, had then to sell to the refiners in America, England, and on the Continent. Their agents had sometimes received 1s. per lb. for the nickel in the matte, and in some cases only 7d. per lb. in mattes containing 25 per cent. of nickel, and 15 per cent. to 20 per cent. of copper. In 1891 he conducted a series of experiments by the Mond process. The first trial was made on crude ore, which contained about 3.35 per cent. of nickel, and 1.70 per cent. of copper. After several days' treatment, the quantity of nickel obtained was so small that the experiments on that class were abandoned. He then decided to make a trial on matte containing about 25 per cent. of nickel and 14 per cent. of copper, and about 0.65 per cent. of cobalt. After dead roasting, the matte was treated as before, with much better results. The nickel obtained was free from cobalt, the separation of which was important in these ores. It was free from cobalt, although the matte contained 0.65 per cent. of it. The extraction of the nickel was very slow in his experimental plant. Finally he experimented with richer matte, containing nearly 40 per cent. of nickel, and 43 per cent. of copper and an unestimated amount of cobalt; the results were very good. Those experiments had been made on a small scale, a few pounds of ore for a special purpose. He was hopeful that the ore could be treated after it had been received from the mine, first roasting it, and then treating direct by the Mond process; but he found that that was not possible, and so the experiments were abandoned. He had no doubt that the Mond process would work well on the Sudbury mattes. He would be interested to have a

comparative estimate of the cost of a plant which would treat, say 3,000 tons of matte per annum, producing about 1,000 tons of nickel. He would also like to know the cost of working the plant, on either per pound of nickel or per hundredweight of nickel produced. He had been more or less concerned in the nickel and cobalt industries all his life, and he considered the process described the most important advance made during his lifetime.

Cost of Production.

Mr. R. A. Hadfield thought that, in view of the great interest now attaching to the use

of nickel, the Paper would be more complete if information were given with regard to the cost of production. At present the prices were exceedingly high, reaching £120 to £140 per ton. He believed there was a very promising future for nickel steel. When ferro-manganese with 70 per cent. or 80 per cent. of manganese commenced to be used, £100 a ton was paid for it, and the consequence was that it was adopted only on a small scale. He thought the sooner the price was brought down to a moderate rate, the more quickly would the use extend. It was a great mistake to overdo high prices of these special metals. He was aware that the price of nickel had already fallen very considerably, as it was not many years ago since 5s. 6d. was paid per lb. The very admirable process which had been described should effect a further reduction in the cost of production. He believed that in Canada there were other sources of supply beside that of Sudbury. A well-known mining-engineer from Canada had informed him that several large deposits were now being prospected. It was singular that "Our Lady of the Snows" seemed to possess a very large part of the nickel ores of the world, and he was glad they were on British soil, especially at the present time when armour plates were a subject of such great interest. He had had but before him a certain quantity of Mond nickel and nickel made by the ordinary method, and he had produced an alloy of nickel steel with the two metals, one made by the Mond process, and the other by the ordi-

nary process, and sold by the Orford Copper Company. He was pleased to say that Dr. Mond's metal gave steel of very high quality. The Mond nickel gave an elastic limit of 24 tons, with a breaking strength of 36 tons, elongation of 32 per cent., and a reduction area of 56 per cent. The material made from the Canadian Copper Company's nickel gave an elastic limit of 23 tons, a breaking load of 35 tons, elongation 27 per cent., and reduction in area 49 per cent.—not quite equal to the last result. On analysis, the steel contained 0.25 per cent. of carbon in the Mond product, and 0.26 per cent. in the other one; 0.06 per cent. and 0.05 per cent. respectively of sulphur; 0.04 per cent. of phosphorous, 0.75 per cent. each of manganese, and 2.9 per cent. each of nickel. They afforded an excellent comparison, and were very uniform in chemical composition. He also had an analysis prepared of the two metals, and the Mond nickel was certainly slightly purer. The length upon which the elongations had been measured was 2 inches, with an area of 0.5 square inch. He had also made a series of tests on a $\frac{1}{4}$ square inch area, and the results were very similar. Steel makers wanted to obtain the best possible product, and were very glad to see a high-class material in the market such as had been described by the Author. There was not a very large difference—about one per cent. in the nickel, and the carbon in the Mond metal was about half that in the other. In neither case was it high—about 0.16 per cent., and 0.05 per cent. There was also a little more iron in the Canadian Copper Company's nickel. He hoped the new development would add largely to the wealth and increasing prosperity of Canada.

Mr. J. Bernays had had the honour of designing and erecting the original Smethwick plant under the instructions of Dr. Mond, and he greatly admired the beauty of the whole process produced by a few simple mechanical appliances, such as cylinders, elevators, grinders and furnaces. The whole apparatus seemed to be working at moderate heat from morning to night, ore going in at one end and nickel coming out at the other. The plant illus-

trated appeared to be considerably changed from that originally designed, and he noticed that the decomposer had been entirely altered from what it was in the first instance. But such very important inventions always required a considerable number of alterations before the apparatus was brought to perfection.

Sir Frederick Bramwell, Bart., Past-President, remarked that having just seen the

Sir Frederick Bramwell. interesting experiment of the deposition and solidification of nickel out of its condition as a component of a gas, at a temperature of 200°C , he should be glad to know at what temperature solidification took place, when nickel was in the metallic state and had been fused; in other words, what was the ordinary melting-point of nickel?

Dr. Ludwig Mond pointed out that one of the advantages of the process was that the sulphur need not be completely roasted from the matte in the first instance. The matte was roasted three times, and the sulphur left in at the first calcination was removed by the subsequent ones. There was the very peculiar fact that by attacking the roasted matte with sulphuric acid only a certain amount of copper was dissolved, until a definite relation between nickel and copper was established; still, he did not venture to base any theory on this fact. With regard to the questions asked as to the cost, he might say that he had not come to the Institution to transact business, but if any gentlemen were anxious to know any details about that matter he should be very pleased to reply, if they would send their questions in writing.

Professor Roberts-Austen, in reply to the discussion, stated the melting-point of nickel was 1600°C . He had considered the question of cost with very great care, but he felt it was rather beyond him; he was satisfied, however, that the process would compete favour-

ably with any now in use, and he thought it unfair to draw up an estimate as to cost from appliances which were confessedly in a transitional state. That was the reason why he did not produce the thoroughly comprehensive figures which were submitted to him, not only by Dr. Mond, but by Dr. Langer. He might add that Dr. Stansfield examined these data with the greatest possible care. It was with much confidence that he expressed his belief in the economy with which the process could be conducted.

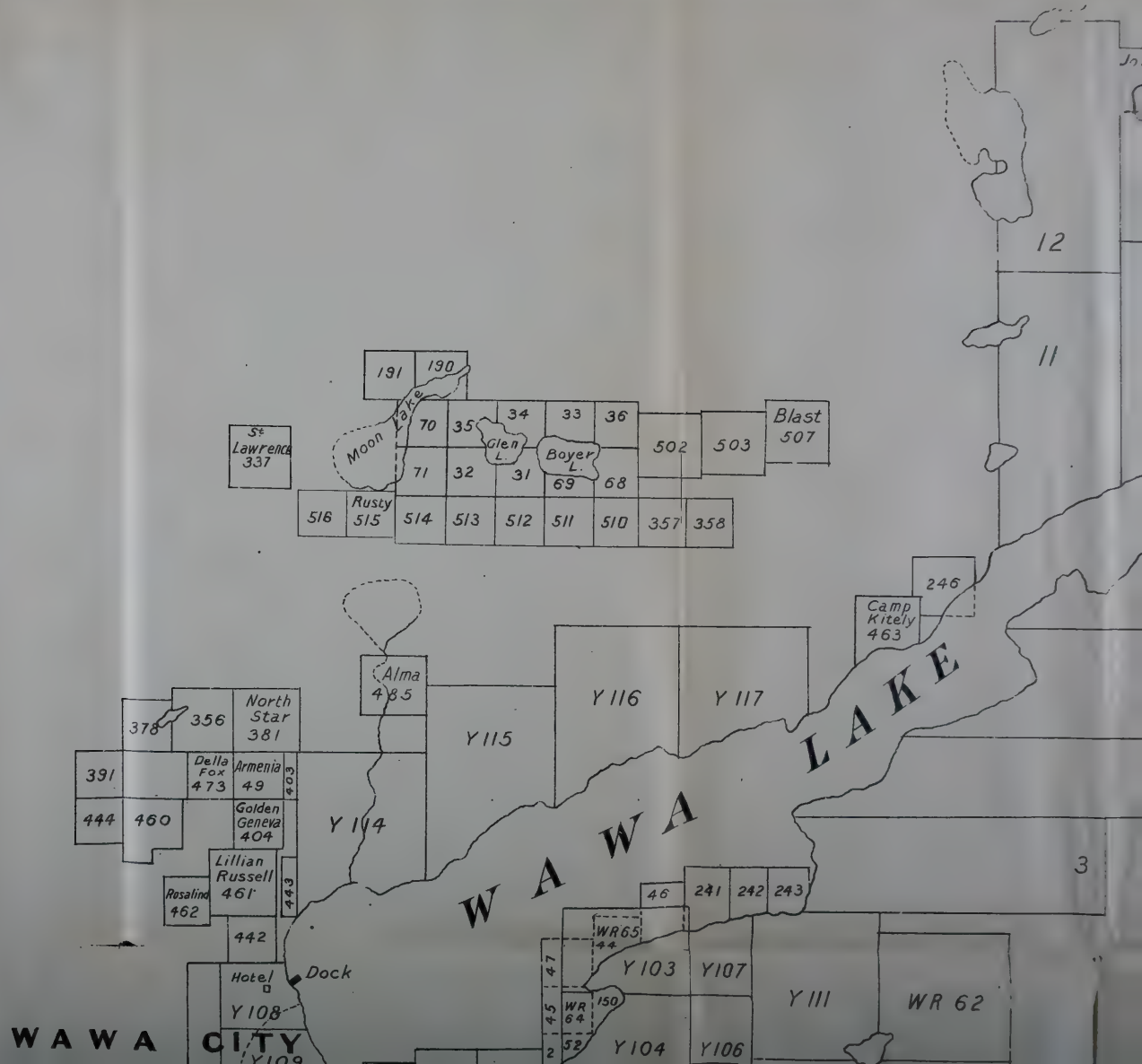
Mr. Thomas Gibb, of Liverpool, pointed out by correspondence that keeping all the appliances for the treatment and circulation of the materials and gases rigidly enclosed would entail much skill in the construction and care in the working of the apparatus; this was made comparatively easy by the extremely low temperatures at which the operations were conducted compared with the temperatures usually employed in metallurgy. The Author could not have done a better service to metallurgy than bring before the Institution this unique process, now that its initial difficulties had been patiently and, to all appearance, successfully combated, and it was likely to be launched as an important industrial operation. The process, worked on a large scale, involved a large production of sulphate of copper. For instance, the 1,000-ton plant contemplated would have to be accompanied by plant for the production of 4,500 tons of crystallized sulphate of copper, and any general adoption of the process would entail a formidable competition with existing works. The copper could be precipitated either by iron or electrolysis; but, however it was performed, the plant for, and cost of, its utilization would have to be reckoned with whenever its quantity became too large to be advantageously placed on the market as sulphate.

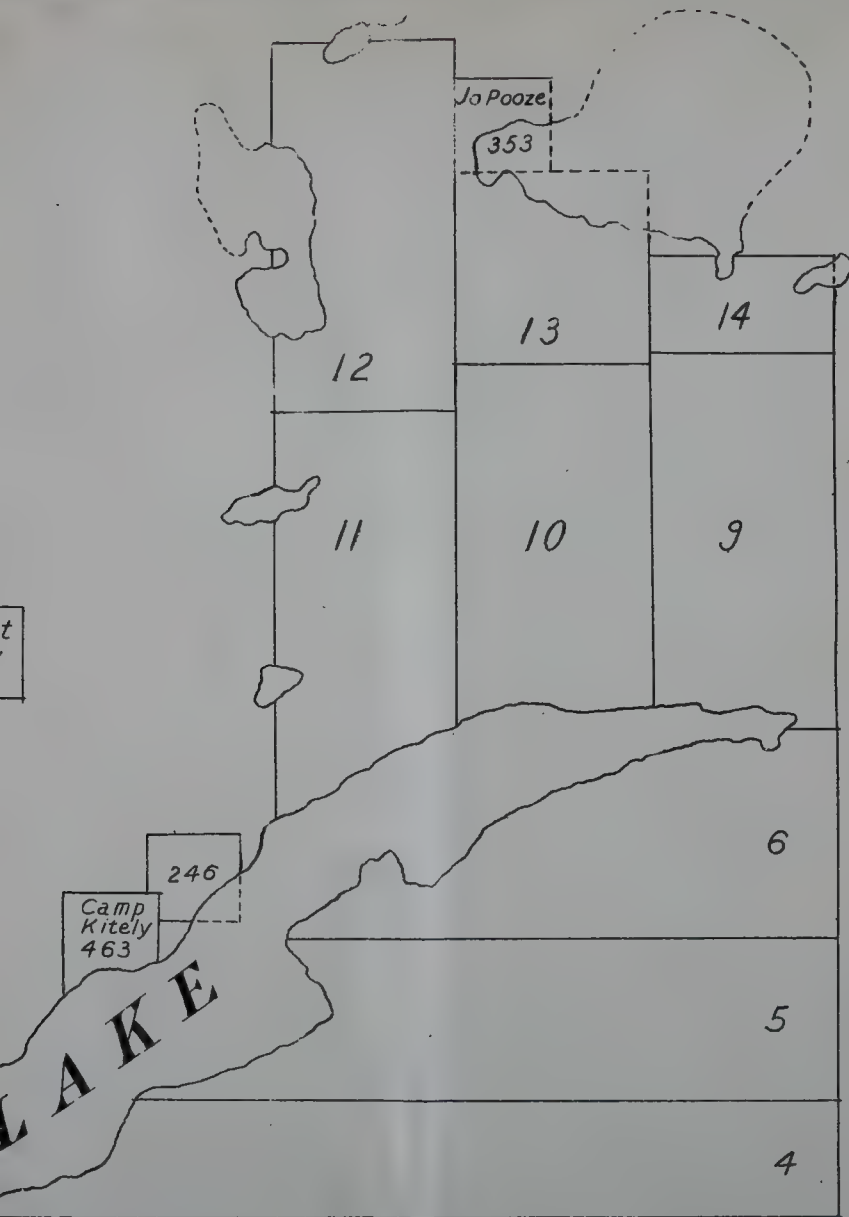
Mr. Gibb on Features of the Process.

Prof. Roberts-Austen on the Economy of the Process.

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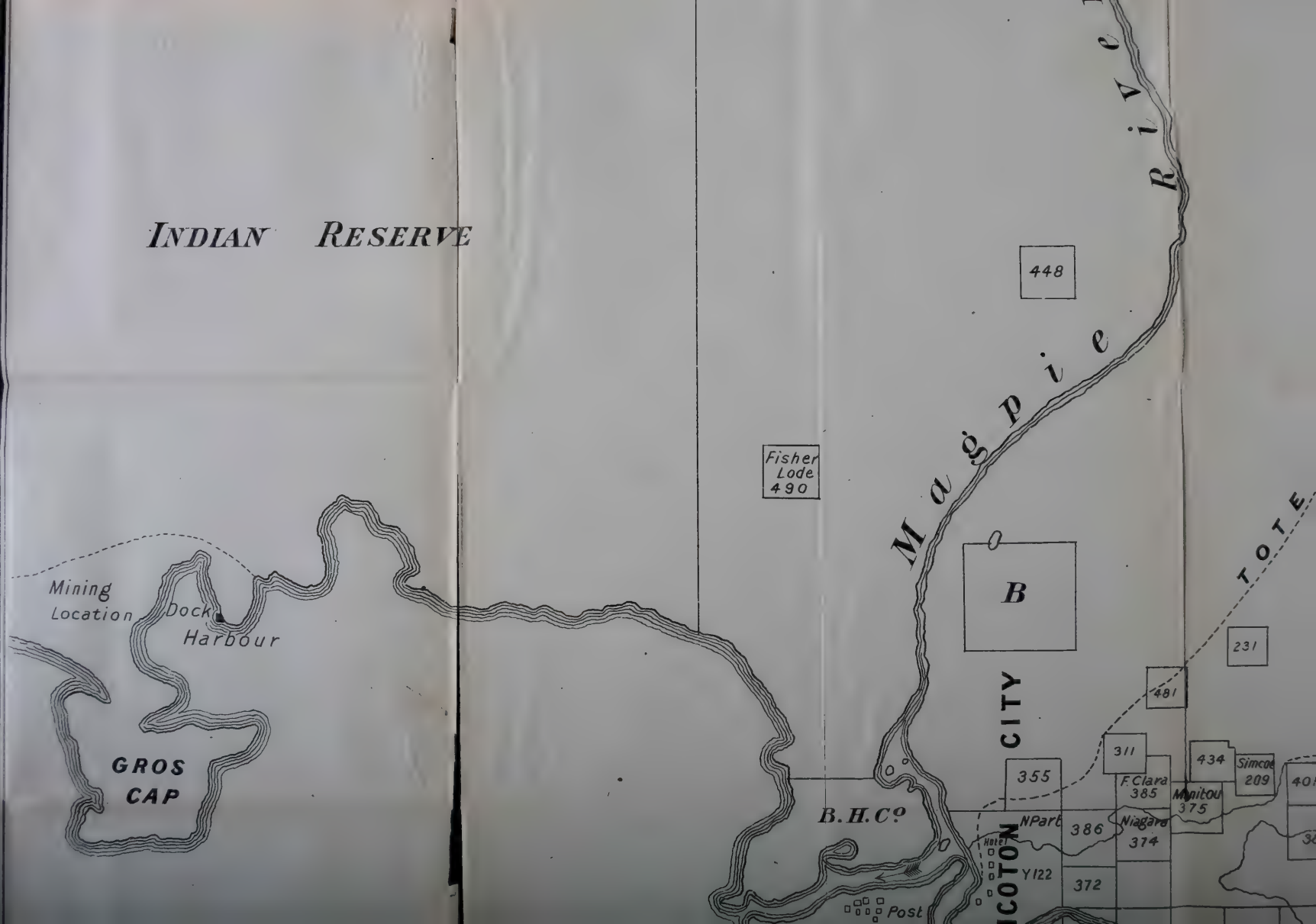


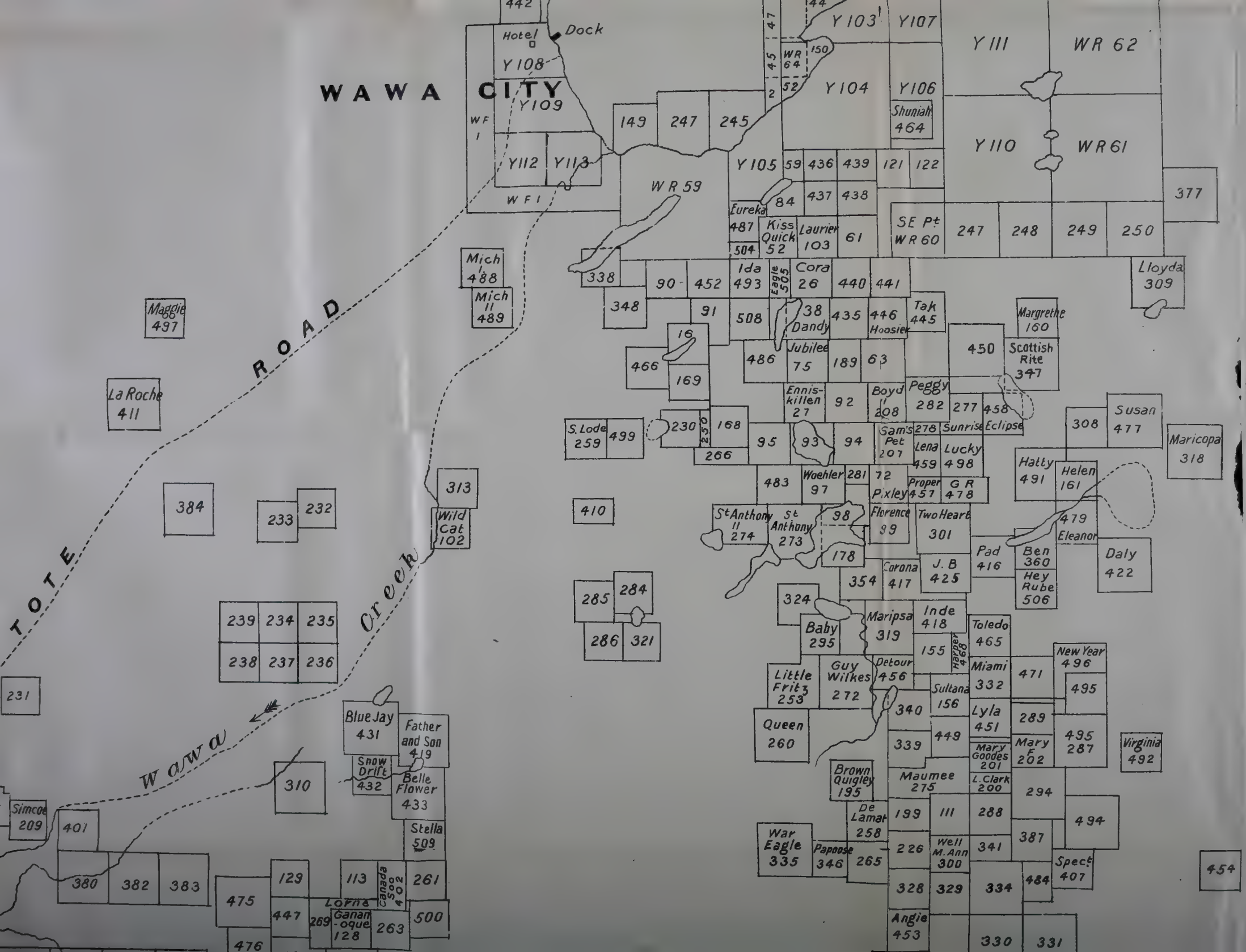


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INDIAN RESERVE





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Virginia
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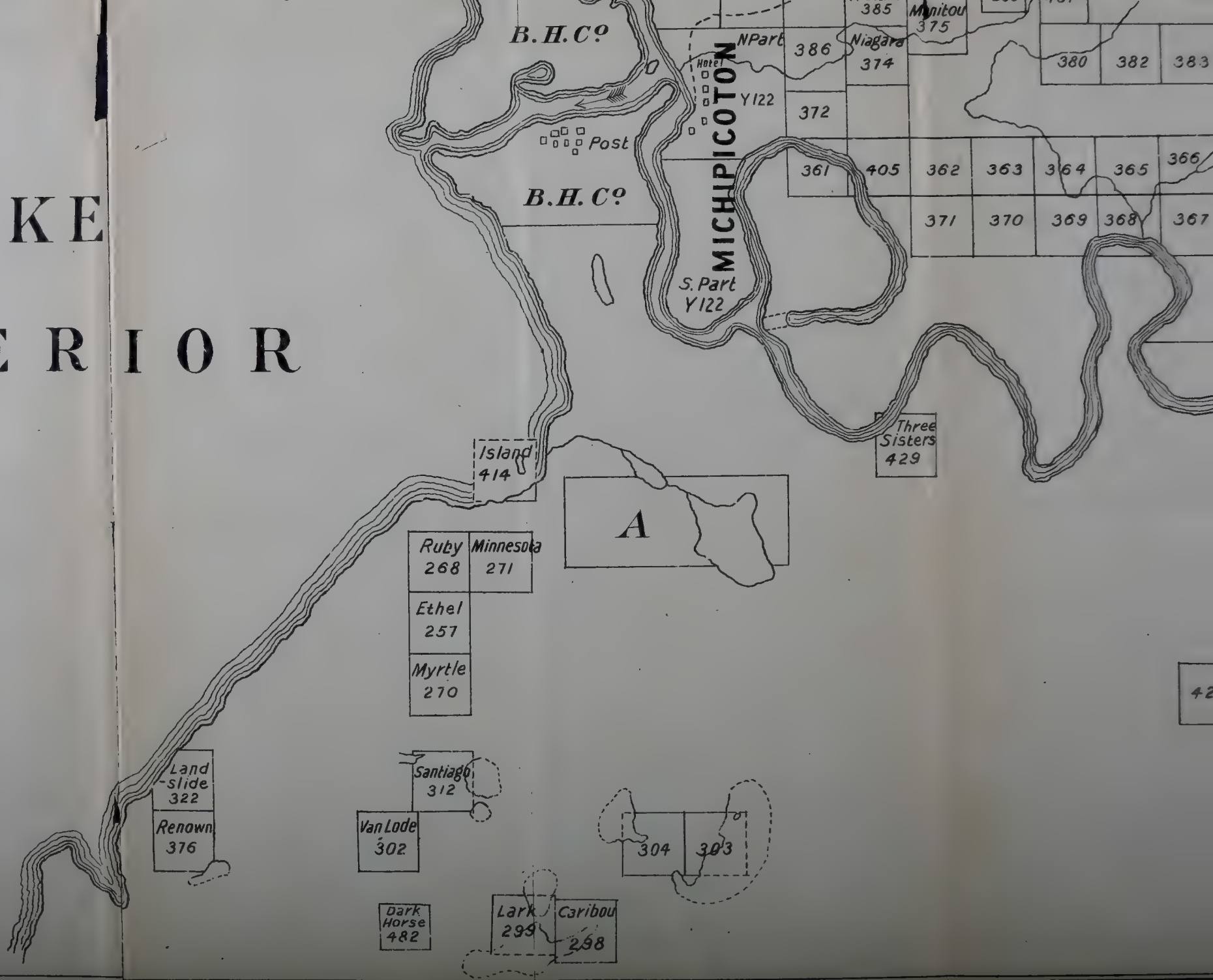
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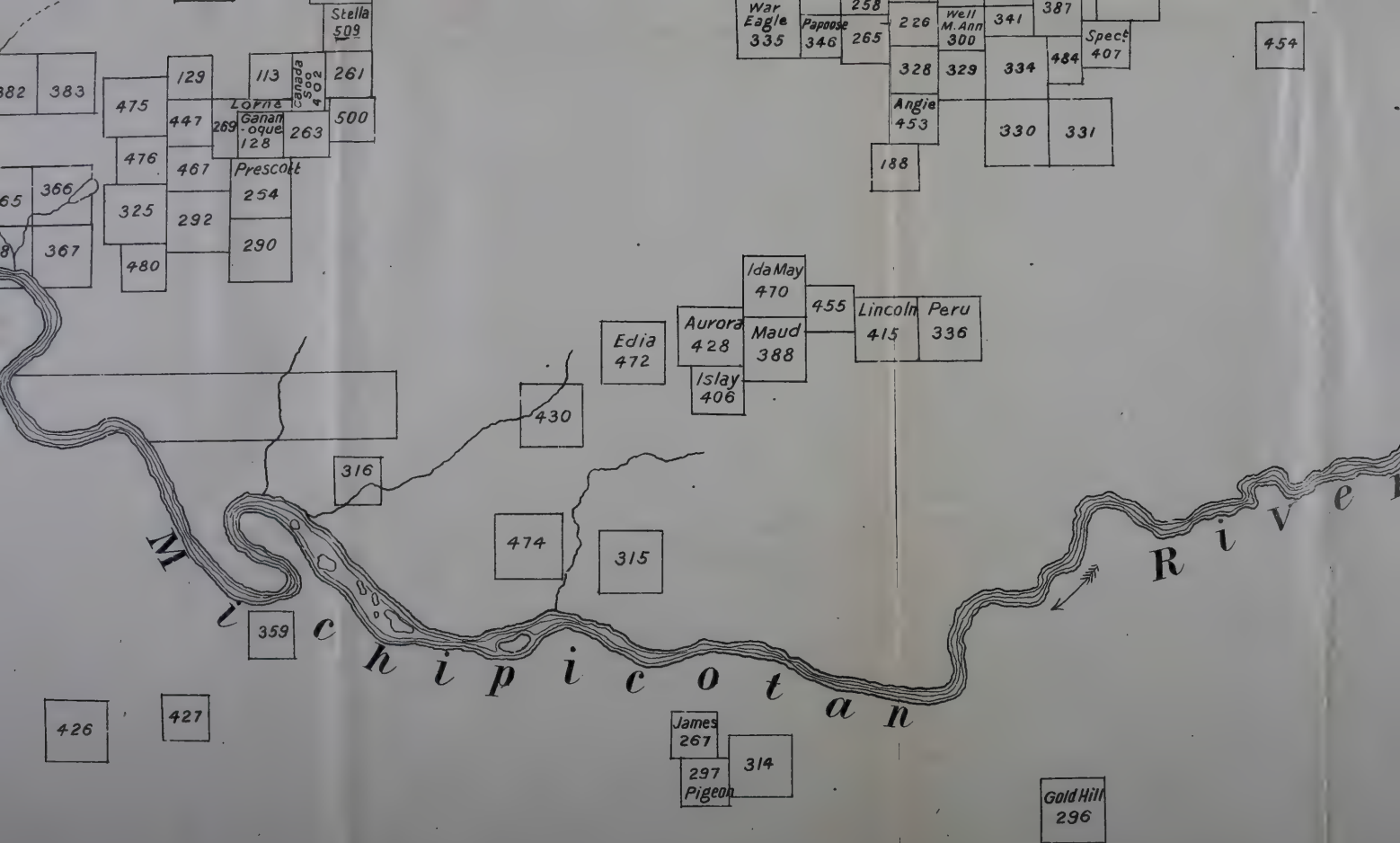
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OF
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LAKE SUPERIOR



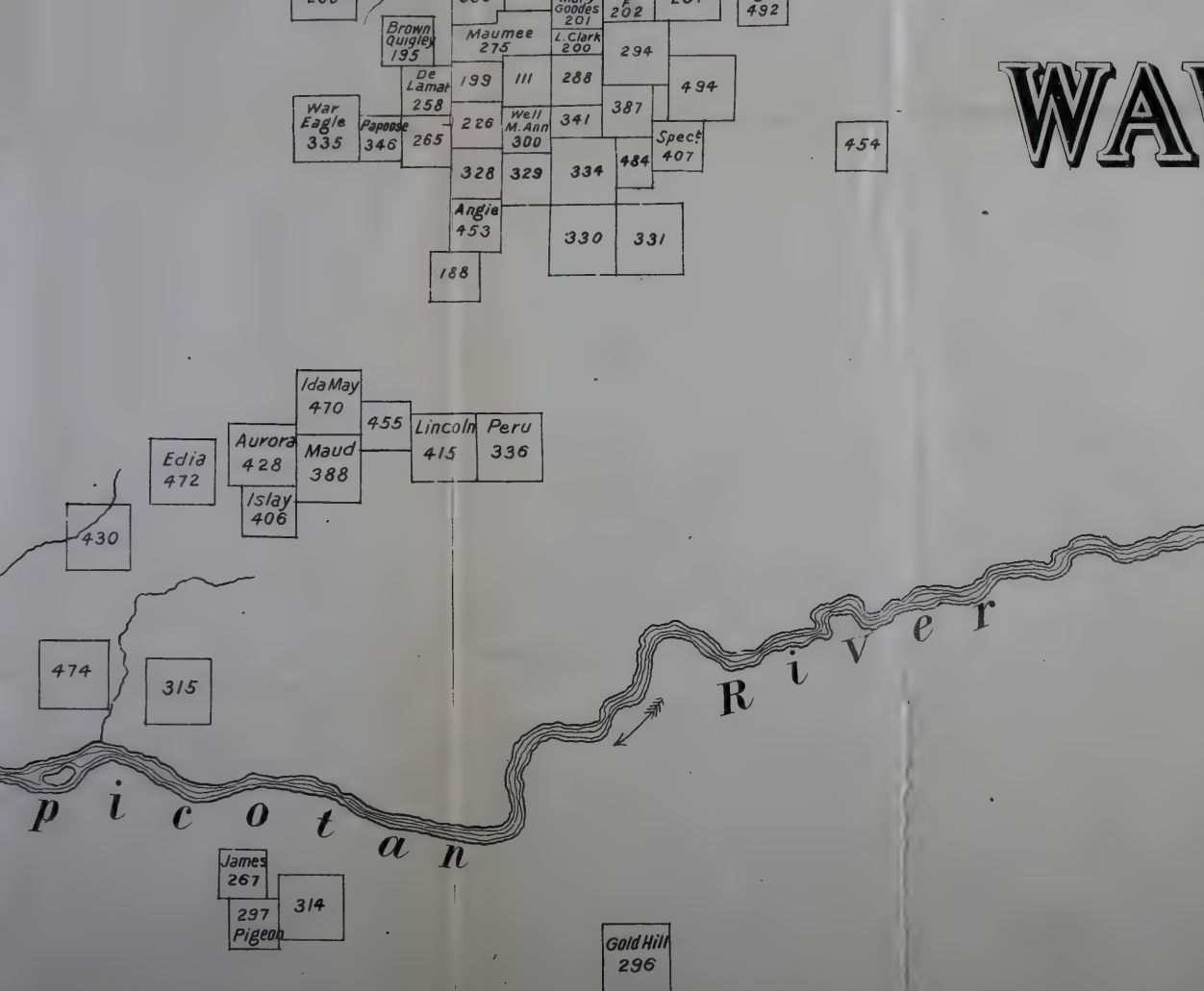


WAWA LAKE.

Scale 40 Chains to an Inch.

1899.

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REPORT OF

THE BUREAU OF MINES

VOLUME VIII—SECOND PART

1899

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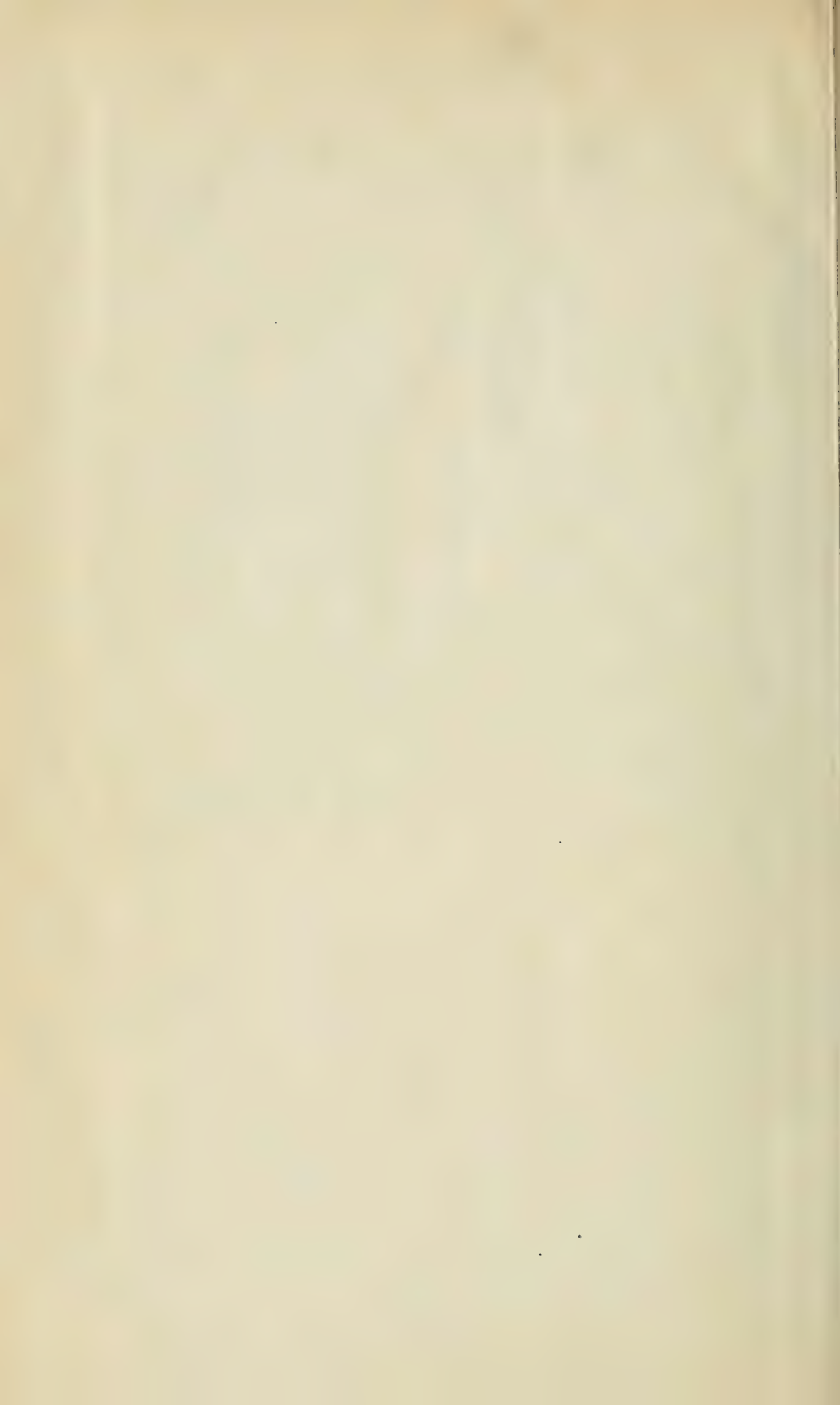
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INTRODUCTORY NOTE.

The following table presents by quantities and values the statistics of metallic production in Ontario for nine months ending September 30, 1899, and for twelve months ending December 31 in the years 1896 and 1893 respectively :

Metals.	1899 (9 mos.)		1896 (12 mos.)		1893 (12 mos.)	
	oz.	\$	oz.	\$	oz.	\$
Gold	20,210	318,212	7,154	121,848	1,695	32,960
Silver	98,600	58,800	.....	.....	.....	.....
	lb.		lb.		lb.	
Nickel	1,608,000	566,633	3,897,000	357,000	3,306,000	454,702
Copper	4,642,000		3,736,000	139,660	2,862,000	115,200
	tons.		tons.		tons.	
Pig Iron	48,216	693,455	28,302	353,780	.....	.....

No silver was produced in the Province in 1893 or 1896. The mines were closed down in 1892 and were not re-opened until 1898. The first production of pig iron after an interval of more than thirty years was in 1896, and the first production of gold after almost as long an interval was in 1892. The total value of metallic products in 1893 was \$602,862 and in 1896 \$963,288. For the nine months of the present year it has been \$1,637,100, and if the same rate of production be maintained to the end of the year it will reach \$2,200,000. The total value of the metals produced in the Province for the twelve months of last year was \$1,655,968, made up of \$290,919 gold, \$51,960 silver, \$514,220 nickel, \$268,080 copper, and \$530,789 pig iron. The revenue from sales and leases of mineral lands has been \$147,666 for the nine months of the present year, as compared with \$97,762 for the whole of 1898, \$40,588 for 1896 and \$26,159 for 1893.

Part II. contains in addition to the Reports of Dr. Coleman on the Copper Regions of the Upper Lakes, of Mr. Parks on the Nipissing-Algonia Boundary, of Prof. Miller on Corundum, etc., special Reports of work done during the present year on the Michipicoton Iron Range, on Copper deposits in Parry Sound, and on the Lower Seine Gold Mines A. B.

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Oiseau Bay

White Gravel River

Spruce Harbour



Tip Top Mount 2120 feet above Sea

Swallow River

Otter Is.

Otter Head

BARO

HOMER

Bremner

Peenay Lake

Height of L

Pucoswa River

Rapids 27 ft

Rapids 90 ft

Falls-22 ft



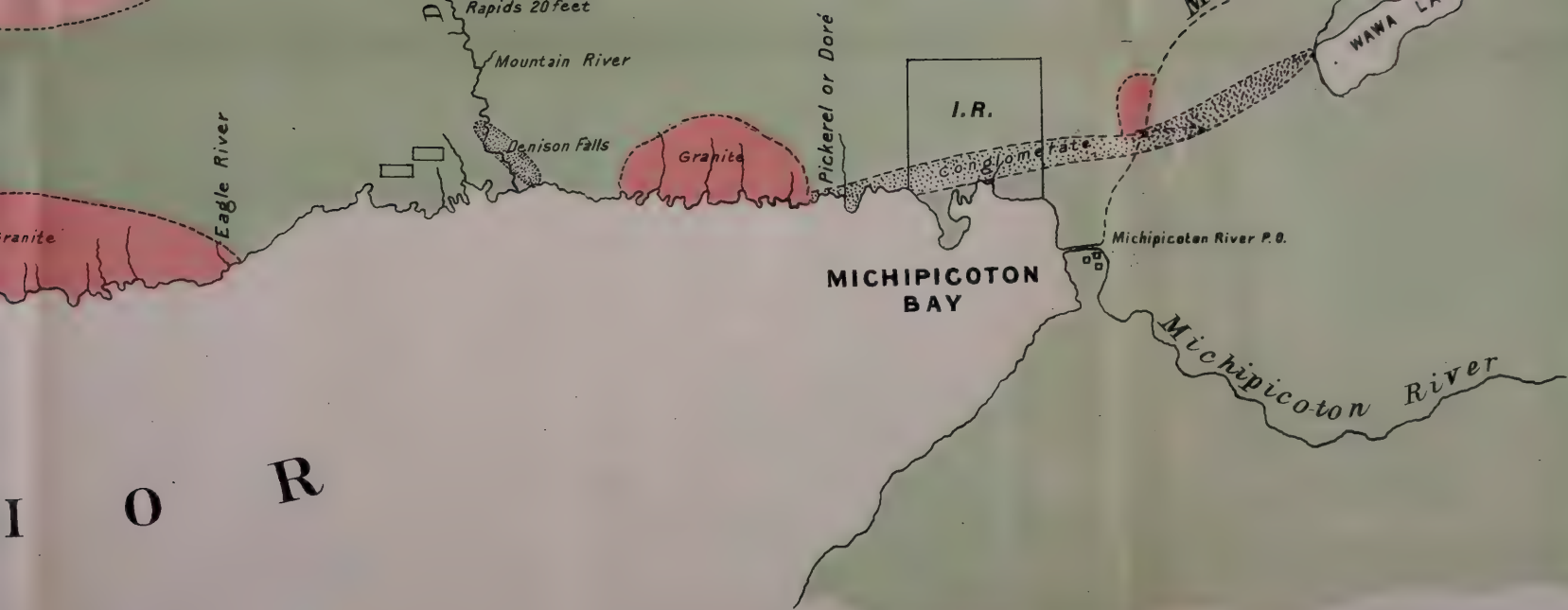
MAP
OF THE WESTERN PART
OF THE
MICHIPICOTON MINING DIVISION
DISTRICT OF ALGOMA,
ONTARIO.

Scale 4 Miles to an Inch.

1899.

-  Granite
-  Huronian
-  Laurentian





COPPER REGIONS OF THE UPPER LAKES.

By Dr. A. P. Coleman.

Introduction.

IN accordance with the instructions of Mr. Archibald Blue, Director of the Bureau of Mines, last summer's work was devoted to an examination of the rocks on the north channel at the northwest end of lake Huron, and of the northeast shore of lake Superior, with special reference to the copper deposits of the region. Professor Arthur B. Willmott, of McMaster University, was once more appointed assistant geologist and proved as helpful and efficient as on former occasions. Messrs. R. W. Coulthard and R. D. George, B.A., were appointed junior assistants and rendered valuable service during the summer's work. Our modes of travel were more varied than usual owing to the different type of country in which we were employed, part of it more or less settled, with backwoods roads passable with wheeled vehicles, and another part capable of being traversed only with canoes; while the main portion of our travel along the stormy shore of lake Superior was performed in a Collingwood skiff manned by two skilful French-speaking fishermen from Sault Ste. Marie, Edward Sayers serving as captain and Stephen Jollineau as seaman and cook. Both did their work satisfactorily. Our craft, the Caribou, carried only two fore and aft sails and had very little accommodation under the deck covering the bow, so that we had to camp at night at some harbor or shore. She was safe as handled by Sayers and proved a good sailor, but very heavy to row, which occasionally cost us much time and labor. Travelling by canoe or row boat has many advantages, but on so large a lake as Superior one runs a certain risk in a small boat and may lose days in succession by high winds. Fortunately there are innumerable small harbors on the wild and rocky north

shore of the lake, so that a fishing boat seldom requires to go more than a few miles to find shelter.

We left Toronto on June 7th and proceeded by way of Collingwood to Sault Ste. Marie. A canoe trip was made down the St. Mary's river as far as Thessalon to examine the rocks of the Huronian as originally defined by Logan, and to visit the copper deposit at Bruce Mines and other points. We then cruised from the "Soo" along the northeast shore of lake Superior, coasting with canoes as much as the weather permitted, and visiting the copper mines near Mamainse. This trip ended at Heron bay, where the Canadian Pacific railway first touches the lake. Here we divided into three parties. Prof. Willmott and Mr. George went east by rail to White river and pushed south by Dog river to lake Superior over unmapped territory which they surveyed with micrometer and compass. Mr. Coulthard with Sayers went south to examine Caribou island, and I crossed unexplored territory from Bremner on the railway to the mouth of Pucaswa river on lake Superior, making a track survey. The Caribou picked up Prof. Willmott and myself and took us to Michipicoton island, where copper deposits were examined; and then to Michipicoton Post, the gateway to the new gold mining district, which we visited. Here the Caribou was dismissed and we finished our travel by steamer Telegram.

During the summer, as directed by Mr. Blue, we visited all the water falls possible, and determined their height and the volume of water at the time in order to obtain materials for a report on the numerous and important water powers of the region.

After revisiting the Huronian tract east of the "Soo" we returned via Owen Sound

and reached Toronto on August 14. As on former occasions, my acknowledgments are due to many mining men and others interested in the development of the region for valuable assistance and for ready hospitality. The maps and reports of the Geological Survey of Canada were of course of the utmost value to us in carrying on our work. The old map of the Huronian region, prepared to accompany Logan's geology of Canada in 1863, is still the only geological map available for the study of the region just east and just north of the St. Mary's river; and was found to be very accurate as far as we covered the ground, though on too small a scale to permit of very minute mapping.

The Blue Mountains.

Desiring to examine the Blue Mountains and the old beaches on their flanks, Prof.

Willmott and I left Toronto for Collingwood a day earlier than was necessary to catch our steamer, and

drove out to the nearest part of the long escarpment which stretches across the southwestern peninsula of Ontario and is known everywhere from Hamilton to Georgian bay as "the Mountain." It is really of course the edge of a tableland capped by the resistant Niagara limestones, the softer shales to the east having been more rapidly denuded by the action of frost and water, leaving the limestone-covered portion to rise as more or less prominent cliffs. Between Collingwood and the foot of the Blue mountains the land is almost a plain, sometimes boulder covered, with a series of gentle steps, probably representing old shore lines, up to 207 feet (aneroid); above which there is a steep ascent over grassy or wooded slopes, mainly of reddish and greenish Medina shale. There appear to be beach lines also at 288 and at 468 feet above the bay as shown by aneroid, and probably also at 940 feet.

The top of the escarpment is of thickly bedded limestone of a creamy color, forming perpendicular and often unscaleable walls, with a talus of rough, frost-quarried blocks at the base. This cliff is divided into pillars and bastion-like projections by profound fissures, many of which still retained the

winter's snow on the hot day of early June when we visited the spot.

The rock is burned for lime, and, if in demand, would make a handsome building stone, which could be furnished in blocks of almost any dimensions required.

A few hours stay in Owen Sound was utilized in examining the drift terraces in the rear of the town. Clays making red brick and white pottery occur here.

St. Mary's River and the North Channel.

On June 10th we reached Sault Ste. Marie, our starting point for a study of the original Huronian as described by Sir William Logan, and his assistant, Alexander Murray, whose work still gives the most complete account of these interesting rocks and is referred to in every text book of geology. A good summary of their results is given in the 1863 report,¹ while Murray's more extended earlier reports are now hard to get.²

On June 11th we set out by canoe down the St. Mary's river, halting for the night at Garden River, where interesting exposures of the original Huronian rocks are to be seen. The channel we followed is now almost deserted by steamboat traffic since the opening of the shorter and straighter cut on the American side. Only a few local craft now ply here, and the villages and landings often have rather a deserted look.

Garden River Marble Quarry.

The village of Garden River was once an important lumber centre, but has fallen away since the mills were burned some time ago. There is a reserve at the mouth of the river with an Indian village and a mission under the charge of the English Church. The village is on a very pretty sandy point, but two or three miles inland rocky hills, almost high enough to be called mountains, rise with steep flanks and more or less rounded, woody summits. Some years ago a marble quarry was opened on a band of Huronian limestone not far from the village, a switch being carried north from the railway to give access to

¹ Geology of Canada, 1863, pp. 55-63

² Geol. Sur. Can., 1857, p. 18, etc., and 1858.

it. The stone displays variously banded surfaces of pale gray, and would probably be handsome when polished. The quarry had been opened up to a considerable extent, and a channelling machine put at work, but apparently without being satisfactory, as it has been abandoned and the rails removed from the spur of track. Further mention will be made of this limestone in the portion of the report dealing with the Huronian question.

The railway has opened a gravel pit in some old beach deposits east of the quarry, showing a face of about 20 feet. The materials obtained are used in filling a long trestle at the mouth of Echo river a few miles to the east. Much higher terraces of drift materials are found up the valley of Garden river, but these will be discussed under the head of pleistocene geology.

Victoria and Cascade Mines.

An excursion was made under the guidance of George Kabaoosa to the Victoria mine north of the Indian reserve, passing wide forest-covered terraces between rocky walls as we ascended the river valley. We were struck by the rich forest with its splendid maples along the way, the only unpleasant feature being the number of tent-caterpillars which attacked the leaves and dropped upon the passers beneath. The road was fairly good up to lake Ann, being used to this point by lumbermen. The damming and raising of the lake here cuts it off, and the last two or three of the nine miles to the mine are in very bad repair. Beyond lake Ann we found a few outcrops of Laurentian-looking gneiss with dikes of granite rising through the drift, but at the Victoria lake near the mine rock looking like Huronian shows itself again as greenstone and chloritic and other schists broken by some small granite dikes and apparently inclosed in granite or gneiss. The two lakes are small, really only ponds, and the stream connecting them and flowing to Garden river is unimportant.

At Victoria mine there are numerous buildings, a boarding house, shaft house, mill, assay office, dwellings, stable, etc., with a tramway to the dump. The mill is of respectable size, but no machinery is to

be seen except tanks, jigs, etc., for concentrating the ore, apparently little used. The large dump consists chiefly of chlorite schist with some quartz. There are at the mill a number of barrels of galena in small lumps and some powdered ore of the same kind. Associated with the galena one finds some dark zincblende and copper and iron pyrites as well as quartz. This mine was visited in 1876 by Dr. Bell, who describes two veins as being worked at the time, one of solid galena only three inches across at the surface but widening to nineteen at the bottom of a shaft fifteen feet deep. A sample of galena taken from the ore pile yielded 163 oz. of silver per ton of 2,000 lb. when assayed by Dr. Harrington. Two other samples however taken by Dr. Bell himself from the veins assayed only 12 and 2 oz. per ton.³ An assay in the laboratory of the School of Science, Toronto, gave 3 oz. 16 dwt. per ton.

Three-fourths of a mile farther up stream, along a good road paved with tailings, is the Cascade mine, with similar ore with the addition of calcite. The rock dump is large, and consists mostly of soft green chloritic schist with dike material of red granite and some greenstone breccia. The ore in both mines seems to occur in irregular veins in large dikes or masses of sheared and weathered diabase. The Cascade mine is provided with a mill, shafthouse, engine house for a compressor and dwelling houses. A dam provides water which falls at the "cascade" about 50 feet, though the stream is of small volume. An assay of the galena yielded 9 oz. 16 dwt. of silver per ton.

Though there are no settlers in the valley, perhaps because the lower end of it is included in the Indian reserve, there is a considerable area of very fair land to be seen on the road to these mines.

Echo Lake Region.

Proceeding down the stream from Garden river we stopped first to examine a high projecting hill of altered diabase a mile to the north of Great Lake George, probably a mass erupted through the Huronian, now standing out because of

A Plague
of Tent
Caterpillars.

³Geol. Sur. Can. 1876-77, pp. 212-13.

its greater power of resistance to erosion. Along this part of the shores the poplars and to a less extent other trees were stripped of leaves by a plague of tent caterpillars. Even ferns and alders were somewhat attacked, and one could hardly step on the rocks without crushing the creatures. Some of the woods looked as bear as if swept by fire.

Echo river opens into wide shallow flats with marshy borders and Great Lake George is very shallow itself, the steam-boat channel requiring to be dredged almost the whole length of the lake.

Entering the river one sees white hills of Huronian quartzite on the east shore, with cultivated farms in the valleys. The river winds towards the northeast for three or four miles through alluvial plains until beautiful Echo lake with its mountainous shores opens out. Just where the lake enters the river there is considerable clearing at the foot of a mountain, and a farm house with a garden full of bloom, an unexpected sight in this somewhat wild region. The shores of Echo lake present excellent exposures of the Huronian, as noted by Murray in 1857. The limestone band seen at Garden River shows as two promontories on the lake, and has the same character as at the former point.

A good road leads a mile northwest to the buildings of the Austin copper mine, and a poorer road goes some distance farther to the shafts which are high up on a hill. In addition to the shafts a tunnel has been driven into the hill, which consists of Logan's "slate conglomerate," a graywacke containing a few pebbles. The ore on the dump is white quartz with some copper pyrites and a carbonate like ankerite. The mine has not been worked for years.

An excursion was made to Trout and Iron lakes, north of Echo lake, going up the river a mile and a half, as far as there was good navigation, and then walking inland by old lumber roads. Trout lake is about three miles from the landing place and 350 feet above Echo lake, which is a few feet higher than lake Huron. The lake is very pretty, with high rocky shores to the north, partly of handsome jasper conglomerate.

This outcrop of red jasper conglomerate is not noted on Murray's geological map of the Huronian region, but was found by Prof. Willmott ten years ago. Iron lake lies two or three miles northwest of Trout lake, is about a third of a mile long and 575 feet (aneroid) above lake Huron. At its outlet a creek flows swiftly down through a rock wall ravine to join Trout creek. Fine trout are said to inhabit all these waters. We saw no trace of iron on the lake, but found another outcrop of jasper conglomerate, the most striking of the Huronian rocks. This region was visited in 1876 by Messrs. Lount and Frank Adams, then Dr. Bell's assistants, but they took a course different from ours and saw no jasper conglomerate, only slaty rocks, quartz, etc.⁴

Bruce Mines Region.

Leaving Echo lake we made a hard day's pull against headwinds down Great Lake George and the North Channel to Bruce Mines. Along the lake there are very few outcrops of rocks, but many along the shores of the channel—various rocks of the Huronian on the north side and of Cambrian and Lower Silurian on the south. On June 18 we drove out to the Rock Lake copper mine and the Ophir gold mine, passing Ottertail and Rock lakes, by a road showing great variety of geological interest. As far as Ottertail it runs over stiff gray clay, evidently a lake silt, with exposures of jasper conglomerate and other Huronian rocks along the way. The farm land seems strong, if rather heavy, to this point. Beyond the country grows more mountainous and the valleys and plains more sandy as the road works upward on a series of lofty beach terraces, the highest 470 feet (aneroid) above lake Huron or more than 1,040 feet above the sea.

The Rock Lake copper mine is really only a prospect, no mining having been done. It is on Sandy McCloud's land, and the deposit extends to the neighboring farm on the south. The country rock is chloritic slate with red quartzite just to the south, and the ore bodies are

⁴Geol. Sur. Can. 1876-77. pp. 210-11.

very irregular veins or lenses of quartz running partly parallel to the strike, partly across it. The widest part measures about 12 feet with some decayed rock included, but has no definite walls. The ore is copper pyrites with a little ankerite in quartz. Rusty places with more or less copper ore are seen at other points. A tunnel has been started on the lot to the south to tap one such ore body, but had not reached it at the time of our visit. So little work had been done on the property that no certain idea could be formed as to the quantity of ore likely to be found.

Everything was shut down at the Ophir mine, and as it has been pretty fully described by Mr. Blue, who visited it while work was going on in 1893,⁵ it will be unnecessary to give any account of it here.

The old Bruce copper mine, with its long and irregular open cut running about N. 20°

W., now a yawning chasm partly filled with water, has also been described by Mr. Blue⁶; and as it has long been abandoned nothing further need be said of it. We found, however, that the Wellington mine, a mile and a half north-west on the same vein or a parallel one, was being pumped out by Captain Thomas Trethewey as superintendent for Lord Douglas of Hawick, who represents a London syndicate. We went down the Scott shaft 180 feet to the third level. The fourth level had not yet been pumped out. The veins are nearly vertical, with a width of about eight feet. The walls are sometimes distinct and slickensided, sometimes quite irregular. We found more or less copper pyrites in the quartz on the levels, and also some rich ore on an open cut, but had no time nor opportunity to explore the mine thoroughly. Captain Trethewey says that the lodes are faulted by three dikes.

A new opening was being made on a vein between the Wellington and Bruce mines, and quartz very rich in copper pyrites was to be seen. It was Captain Trethewey's opinion that, although drift-covered at the surface,

the vein or system of veins could ultimately be followed all the way from the Copper Bay location to the southeast end of the Bruce, a distance of 7,800 feet. As the old plans of the mine had been lost, fresh ones were in course of preparation. We were rather surprised to be taken to the gaol to see them. It seems that Bruce Mines is so law-abiding that the lock-up has not had a prisoner for five years, so that the mine captain was allowed to set up his drafting tables there.

On our return journey early in August, we found that Professor Hatch of London was sampling the mine with a view to reporting upon it for Old World capitalists.

Trap Rock for Road Metal.

Although mining was at a standstill the village of Bruce Mines seemed fairly prosperous, largely, no doubt, because of the farming community growing up about it, more extensive and important than the traveller passing by rail or steam would suppose. Another industry of importance is the

quarrying of "trap" as road metal. This is carried on by the Spence

Brothers of Cleveland, Ohio, who ship their product to that city for use in making its famous park roads. The firm had 42 men at work in the quarry, at the south-east end of the Bruce mine, and were just beginning operations for the summer. They employed 65 men the previous year. Dr. Spence, the member of the firm in charge of the quarry, gave me some information regarding the method in use in road making at Cleveland, for which and other courtesies I wish to express my thanks. As the method may be of interest to Canadian cities a brief account of it is given here.

As a foundation, blue limestone slabs not less than four inches in thickness are set on edge, and smaller pieces wedged in to make the whole firm. This road

bed is rolled till smooth, when two or three inches of two-inch trap are placed on top and rolled till hard. This is followed by one or two inches of one-inch trap, rolled till hard while wet; then by a half-inch to one-inch of trap having a half-inch diameter, rolled hard while wet; the whole being covered with a

⁵ Third Rep. Bur. Mines, pp. 37-45.

⁶ Third Rep. Bur. Mines, pp. 35-37.

half-inch of trap dust, which is wet down and rolled till water stands on top and hoofs leave no impress. Twenty-ton rollers are used for the work, which costs at present \$2 per square yard. The cost was formerly \$3.50.

The trap is a greenish-gray medium-grained diabase, which forms the country rock of the copper veins of the region, and is present in inexhaustible quantities. Some small quartz veins occur in the rock quarried, but the quartz is picked out and rejected.

This mass of diabase, included by Murray in the "lower slate conglomerate," is evidently of later age than the Huronian, since at more than one point to the east of the harbor it may be seen penetrating eruptively the red quartzite.

Other Excursions.

After examining the shore as far as Thessalon and studying the contact of Laurentian and Huronian four miles beyond on the small islands scattered along the shore and also on the railway, we returned to Sault Ste. Marie. The results of this study will be given in another part of this report. Visits to a copper mine and also a supposed placer gold mine north of Thessalon were postponed till our return journey, when it was expected that the placer would be in operation.

Before leaving the "Soo" an excursion was made some miles northeast to examine the Laurentian-Huronian contact at a fresh point, and a brief survey was made of an extraordinary wash-out in an old lake terrace on section 9, two miles south of the boundary of Tarentorus township. Springs have undermined the drift materials and carved in three years a V-shaped ravine nearly 300 feet in length and 110 feet in depth at its outlet. It is said that most of the work was done in a single year. The road was destroyed and had to be shifted 100 yards to the west, and Silver creek, flowing in the valley below, was forced a long distance to the east by the debris which filled its valley, so that it now flows among the trees in the woods.

Northeast Shore of Lake Superior.

On arrival at the Sault all arrangements were made for the Lake Superior trip, which

Literature
of the
Region.

began on June 22. The shore has been visited at various points by a number of geologists, especially at the copper deposits near Mamainse and on Michipicoton island, in regard to which there is a considerable literature, mostly of scattered papers and mine reports. An outline of the history has been given by Mr. Blue, who visited the region in 1893; and his report quotes the opinions of the more prominent geologists who have examined the copper mines.⁷ The general geology of the region has been sketched by Sir William Logan in the *Geology of Canada*,⁸ and Dr. Bell traversed the shore in 1876,⁹ from Batchawana bay to Michipicoton river.

Along St. Mary's river and for varying distances inland one sees only the St. Mary's sandstone where the solid rock is not covered with thick lake deposits forming a succession of terraces. The sandstone is red or green or pale gray or mottled, and has some shaly layers. It is best seen along the banks of the Canadian and American ship canals, where it is often beautifully ripple-marked and cross-bedded, being evidently a shallow water formation. As no fossils have been found with certainty in it the age has not been positively determined. Logan thinks it of Chazy or Cambro-silurian age;¹⁰ but others place it in the Potsdam or Upper Cambrian. As noted by Logan, these sandstones lie nearly horizontal, unlike the other and older rocks of the region, which are usually tilted more or less steeply; and the country which these soft rocks underlie is usually flat and low, differing greatly from the parts formed of Huronian and Laurentian rocks. This sandstone is to some extent available for building purposes, though rather soft and fragile, as well as too much inclined to cleave into blocks of unmanageable shapes, to be considered a good building stone.

Following up the shore, Gros Cap, where the sandstones end and rocks mapped as

Laurentian begin, is the first point of interest. The cape rises in a

⁷Bur. Mines, 1893, pp. 63-88.

⁸Geol. Can., 1863, pp. 70-86, also p. 699, etc.

⁹Geol. Sur. Can., 1876-7, p. 213, etc.

¹⁰Geol. Can., 1863, p. 86.

mountainous way with sheer cliffs towards the west, and is a very striking feature. There is a small landing on the southeast side of the point for fishing boats, and a saw-mill with a few settlers' houses are scattered along the low sandy shore to the east. In the rear of the little settlement two old lake terraces rise, one 56 feet, the other 224 feet, above lake Superior.

The rock at the point of Great Gros Cap is red porphyry, containing a few fragments of rather coarse quartzite, so that it is no doubt later than Huronian, but just around the point one finds a few hundred yards of diabase and then Laurentian granite or gneiss. At various points beyond amygdaloidal diabase (or melaphyre) and red quartzless porphyry occur in small patches, and with them veins of calcite and a red material like the vein matter associated with the lake Superior copper ores; so that the projecting points of the coast consist of the Keweenaw or Upper Copper-bearing series, while the interior is Laurentian. The latter shows much variety, including greenstones and hornblende schist very like the Keewatin of Rainy lake, red granite, syenite and gneiss.

After rounding the point a thin strip of the St. Mary's sandstone extends along shore to the mouth of Goulais bay, after which the shore is again formed of Archæan rocks. We attempted to enter the mouth of Goulais river so as to anchor there and explore it, but found a bar stretching across its mouth giving too little water for our craft, which drew about $2\frac{1}{2}$ feet. Later in the summer Prof. Willmott and I drove out to the river from the Sault and examined parts of the valley and surrounding mountains. As the first rapid is 30 miles up Goulais river, which winds through alluvial flats in the lower part of its course, we were unable to carry out our instructions regarding the examination of water powers without spending more time than could be spared. There are said to be three high falls about 40 miles up, and as there is a considerable volume of water these may in the future furnish valuable power.

The point on the west of Goulais bay, where the mission and a small fishing station

are placed, consists of St. Mary's sandstone, and the same flat lying rock forms the shore until the mouth of Batchawana bay, the next inlet to the north.

Batchawana Bay.

The name of this bay is spelled variously by different authorities. Logan's map makes it Batchchwahnung, the British Admiralty chart of lake Superior spells it Bachewanaung, and the United States chart follows its precedent. The map issued by the Crown Lands Department of Ontario gives it the form Batchawauung; and the people of the region generally call the bay Batchawana. The last form is easily spelled and pronounced and, as it is rather euphonious, should perhaps be preferred.

The bay has a very interesting shore line, rising to low mountains towards the south-east, east and north, and presents fine outcrops of Laurentian, Huronian and St. Mary's sandstone the latter mainly at its outlet and on a large island which stretches more than half way across the entrance. As usual, the Cambrian sandstone lies nearly horizontally and forms the low ground, while the harder and more ancient rocks rise steeply as hills, at one point on the east to a height of 690 feet as determined by aneroid.

Small bands of Keweenaw or Upper Copper-bearing rock come out on the east shore, as mentioned by Logan, though not so mapped. There are small outcrops of red quartzless porphyry and larger ones of amygdaloid, the latter forming a row of hills running about east and west at the northeast corner of the bay. The rocks just referred to are very much like the Keweenaw farther west.

Professor Willmott gives the following account of the geology of the southern portion of the bay:

"The south-eastern shore of Batchawana Bay consists of slate conglomerate holding boulders of coarse-grained red granite. A band of red, porphyritic, granitoid gneiss cuts through the slate, appearing on a point on the west shore and on a point of the opposite shore a mile to the east. This gneiss,

which is in eruptive contact with the slate, in one place loses its porphyritic character near the slate and then assumes it suddenly a few yards away. A few hundred feet from this point the gneiss was observed to hold sharp angular inclusions of basic schists closely resembling the Keewatin contacts of the Lake of the Woods. On the eastern point the gneiss was in places quite dark in color."

The Chippewa river entering Batchawana bay on the north has a splendid fall of over 80 feet about a mile from its mouth.

Chippewa River. Above this there is said to be good navigation for a long distance. The portage past the fall is about three-fourths of a mile and is rough in places.

The Batchawana river also was visited and ascended about six miles, mostly against a swift current. At five and a half miles up there is a rapid too heavy to pole up, so the canoe was taken no farther. No falls of importance were met with in the distance traversed, and few outcrops of rock occur, all that were observed having the look of Laurentian. The shores are often steep cut banks of sand and gravel, with a little stratified clay at bottom, and form well-marked terraces.

The northeastern part of the bay is almost cut off from the western part by the large island mentioned before and a long sandy point projecting southwards. As we approached the latter a group of sleek lumbermen's horses was collected at the point where the wind swept strongest, so as to avoid the flies, which were very tormenting in the bush at the time.

Prof. Willmott describes the Carp river as follows:

"The Carp is a small stream flowing into the north side of Batchawana bay. For the last mile it flows through a sand and gravel plain in a rapid and tortuous course. All obstructions have been removed by the company cutting pulpwood on its bank, so that it is navigable down stream. The banks are often fifty feet high, and in places stratified clay is seen as well as sand and gravel. Beyond the pulpwood camp, one mile inland, the stream is a succession of falls. Two miles and a half from

the mouth the bed is 250 feet above Superior. At this point the rock is gneiss, but changes at once to the south into a band of amygdaloid striking east. Three-quarters of a mile farther down the stream a conglomerate lies against the latter which are both doubtless of Keweenaw age."

There is a steamboat landing and fishing station on the east side of the point which Corby Point. protects the bay from the prevalent west winds; and a lighthouse stands a mile or two south on Corbeau point. The village is not a savory one, since the offal of the fish taken is dumped not far off, forming a perpetual attraction to gulls and crows; and the idle horses of the lumbermen roam the point at will. Lumbering will soon cease in this region, the pine having been removed as well as much of the spruce, balsam and cedar. The material left is mostly valuable as pulpwood, of which we saw large quantities in the more inland parts.

The Mamainse Region.

Rounding Corbeau point we found too much wind to coast with canoes and sailed straight to Roussain's fishing station, where Roussain's Station. there is a small snug harbor and a tiny settlement. The shore here is bold and very rugged, consisting of black eruptive rock in thick layers, separated by beds of amygdaloid and conglomerate. As the latter rocks are soft and easily attacked by storms, they wear away along the shore, leaving the harder eruptive masses standing as cliffs, stacks and islands. Many small caves are eaten by the waves in the softer rocks, the harder layers roofing them over.

The next point stopped at was Mamainse harbor, where narrow channels between small islands and the shore make a tiny Mamainse Harbor. harbor. Sand bay, where the mine of the same name is located, is a mile to the south, but affords little shelter for boats. The mine is not working, being left in charge of a caretaker who served us as guide to visit the different pits and shafts. As the mine has been described by Mr. Blue,¹¹ little need be said of it here. A mile north of the bay,

¹¹ Bur. Mines, 1893, p. 66, etc. References to the literature are given here.

at a small costean pit, there is a plate of native copper eighteen inches long by an inch in thickness standing up from the decayed amygdaloids. This and the pile of ore rich in native copper at the main shaft give evidence that the metal is present in considerable amounts.

About two miles north of Mamainse harbor is the old Mamainse copper mine, worked, it is said, 46 years ago, and again 17 years ago, where a village of 30 houses without an inhabitant may be seen. The houses have stone foundations and are well constructed frame buildings in a fair state of preservation except for doors and windows, all of which have been carried off. There is a church, two shaft houses, and a large mill containing crushing and concentrating appliances. There is very little ore to be seen on the dumps, which evidently consist of waste rock, mainly amygdaloids. The site is an attractive one, but with a very poor harbor. Rugged strips of black amygdaloid and trap run out into the lake with curving beaches of well-rolled pebbles between. The village stands on a low terrace, with wild flowers, red and white clover and wild strawberries all about, and a pretty stream flowing into the lake.

Pointe aux Mines.

Beyond Mamainse rocks apparently of Laurentian and Huronian age show themselves, red granite and gneiss penetrated by dark green dikes and also great masses and dikes of a very coarse grained pegmatite or giant granite, having flesh red feldspars as large as one's hand embedded in a coarse grained granite ground mass. Here and there are strips and masses of Keweenaw rocks leaning up against them, often with a basal conglomerate or breccia of gneiss and granite at the bottom. A few beds of brown shale and sandstone, probably Cambrian, occur at the foot of bays.

Pointe aux Mines from the south seems to be a mixture of Laurentian and Keewatin rocks, but to the north shows amygdaloids and conglomerate having the usual rugged shore formed by Keweenawan rocks. The mine is a few hundred yards inland from the landing place in a bay north of the point.

On the hill side there are the ruins of two or three buildings with massive stone foundations, and the opening of a tunnel with its timbers all rotten and falling in. There are several deep pits farther up the hill and several heaps of rock from the excavations, with little amygdaloid and no conglomerate to be seen. There are also two heaps of slag containing a number of tons resulting from smelting operations. An assay of this slag gave 1.20 per cent. of copper. This mine is reported to have been worked 46 years ago, and is said to have been attacked by Indians. For its defence two cannon and a body of militia were brought up, according to Sayers, the captain of our fishing boat.

There are several heavy square iron stamps on the beach, perhaps landed but not put in place at the mill. In all there must have been a large amount of work done at this mine, but there is now very little ore to be seen, perhaps because all that was obtained had been smelted. Young trees are now growing among the ruins of the buildings, and from the shore there is nothing but woods to be seen.¹²

To the north of Pointe aux Mines in a large bay flat lying sandstones, like those of the last bay, probably St. Mary's sandstones, cover a wide area beneath the shallow water and appear to slope off towards the open lake. The points however are of Laurentian, containing fewer Keewatin inclusions than farther south. The scenery is magnificent, granite cliffs rising 500 feet above the lake. A curious cave shows at the northern point of the bay and two others at 30 and 50 feet above the water, probably old shore caves. Here small patches of conglomerate with gneiss and granite pebbles lean against the granite and are with difficulty distinguished from it. Old chasms in the Laurentian are filled with this rock, proving that an old shore stood just at the level of the present shore and presenting the same conditions. This conglomerate is probably Keweenawan. As the cement is soft it easily weathers out and sets free the

Cf. Macfarlane, Geol. Sur. Can., 1863-66, p. 144.

pebbles and boulders of the old rock to be washed on the present beach as if recently made. A remnant of conglomerate rests against the edge of a large diabase dike and contains boulders of it, showing that the dike is older than the Keweenawan.

These diabase dikes are exceedingly numerous along this part of the coast and have much to do with its shape. Sometimes the dike is the more resistant rock and rises as walls, protecting the softer rock behind or serving as breakwaters for small harbors or forming narrow islands or long points, features noticed by Logan in the *Geology of Canada*. At other times the dikes are less resistant and weather out, forming narrow deep ravines with walls of gneiss. The general strike of the dikes is about northwest and two of them project sharply, one on each side of Montreal river forming a sort of harbor, not well protected however from north-westerly winds.

Montreal River to Little Gros Cap.

Montreal river is probably the largest stream up to this point on the shore of lake Superior. There is a bar at its mouth, above which fishing craft find a safe harbor, though the powerful current is not easy to meet unless a line is taken ashore for towing. The scenery of the harbor is splendid, with its two rocky points and the reddish Laurentian mountains in the rear. Three forest-covered terraces rise above the bay, indicating former higher levels of the lake; and at the inner end of the bay one catches glimpses of the white series of cataracts flowing through a deep narrow canyon by which Montreal river finds its way down from the mountains to the shore. The river was explored six or seven miles inland, and for that distance is very difficult of navigation, being a succession of falls for the first mile or two and then short stretches of slack water separated by long flat rapids up which one must pole.

Instead of following the river up from the bay at its mouth it is necessary to portage south past the point enclosing the bay on that side and then, after a few hundred yards paddle, one climbs up from the shore,

following a trail for some distance on level ground and then up an ascent so steep for 180 feet that canoes cannot be carried but must be dragged. A quick descent leads down from this ridge to the placid river above the main fall, which has in all a height of 172 feet (aneroid). There are two more respectable falls on the way up the river, which rises 250 feet as shown by aneroid in the first six miles. Five portages were made on the way up, but returning all except the three main falls may be run in a canoe.

The river is clear, with slightly brownish waters, and there has been no fire on its shores, so that beautiful woods run to the top of the highest hills when not broken by faces of rock too steep for trees to grow. A good deal of white pine is scattered through the woods; and spruce and cedar are common, some of the latter being of good size. One which was measured had a diameter of 3 ft. 10 in. at the butt. Apparently no lumber has been cut on this river.

There is no agricultural land to be seen as far as we ascended the river, perhaps largely because it flows in a narrow valley below the general level of the mountainous country around.

The rocks observed are Laurentian, with several large inclusions of Keewatin, and some masses of coarse grained red granite and flesh colored pegmatite. These rocks are cut by two systems of diabase dikes, like those whose lakeward projection forms the harbor. It is probable that the canyon through which the river flows in its final cascade was made by wearing out and removing the materials of two such dikes, meeting nearly at a right angle. This would account for the fact that the canyon walls are not vertical, though parallel to one another. The one on the left bank overhangs the river several degrees and stands in places fully 100 feet above the torrent of foam at its foot.

The scenery along this part of the river is extraordinarily wild and romantic, and can scarcely be equalled elsewhere in the Province. It is singular that in its striking canyon scenery this western Montreal river is very like the eastern river of the same name emptying into the Ottawa.

Professor Willmott reports as follows regarding the Agiwa (Agawa or Aguawa) river, entering the lake about seven miles north of the mouth of Montreal river :

"From the mouth of the Montreal river to a point three miles south of the Agiwa the shore consists of gray gneiss frequently much contorted. Some masses of pegmatite occur, and many Kee-watin-like inclusions were seen. There are numerous dikes of greenstone, occurring usually at points, and all bearing 80° to 100° . A sand plain extends south from the mouth of the Agiwa for three miles. It is covered with a fine forest of Banksian pine, straight and branchless for 40 to 50 feet. Just north of the mouth the shore becomes gneiss again. An Indian village and a Hudson's Bay Post were once situated here, but the buildings alone remain.

"The river flows so rapidly near the mouth that it can only be ascended by poling. At one point the current was estimated at four and a half miles an hour, and the width at 150 feet, and the average depth at three feet. Travelling inland, two fine terraces were found at 111 and 126 feet above lake Superior. On the first terrace was an excellent hardwood bush which had been extensively used by the Indians for sugar-making. There is here an area of some extent well adapted to agriculture."

Montreal island, which lies five miles north-west of the mouth of Montreal river, is covered with wood, presents no rock to be seen from a boat cruising like ours, and is without hills.

Bayfield reports that it consists of sandstone, probably like that at Sault Ste. Marie.¹³ The Lizard islands seven miles farther north-west give a good landing and harbor, and so are used as a fishing station. The rock is to be seen here as flat lying sandstone rising only three or four feet above the water. It is mottled and banded with red and white, and has all the characters of the St. Mary's sandstone. There are a few houses inhabited by fishermen on the main island, and at the time of our visit also a family of summer

residents. The island is said to be free from flies and to be the home of many lizards (salamanders). The fishermen state that the water of lake Superior has fallen of late years ; but their houses, evidently a number of years old, now stand only two or three feet above the lake. It is not likely they would have been built any nearer the shore than they are now, which suggests very little change in the level of the water. There are no large trees on the island, perhaps all have been cut off.

Sand river enters lake Superior just east of Lizard islands, and forms a series of falls and rapids for about a mile inland, when comparatively quiet water is reached. In the ascent three well-marked terraces are passed at heights of 72, 144 and 234 to 260 feet (aneroid). The main fall, of 95 feet, is about a mile inland. There is a very good portage path to the quiet water at the head of the rapids, nearly 200 feet above the lake, suggesting that the river is used by Indians ; unlike Montreal river, where the portages are badly grown over and hard to find and follow. It is, however, much smaller than Montreal river. The rocks seen are mainly gneiss, striking nearly east and west and pierced by coarse granite of pale flesh color. One fall is formed by a dike of diabase cutting the gneiss.

Leach island, five miles west of the Lizard islands, shows no rock on its north shore, though gray flat masses of St. Mary's sandstone may be seen under shallow water near shore. The beach is formed of fragments of the same rock, which no doubt underlies this low wooded island. Gull rock, north of this on the way to Gargantua, is of the same sandstone. This rock is used as a breeding place by the gulls, whose half-grown squabs scramble over its stones, while hundreds of fully-fledged birds hover and scream about it. The young gulls are very stupid and helpless creatures, but good swimmers. If tipped on their back in the water they lie there without attempting to right themselves. The young birds are said to be fat and good eating by the Indians, and the eggs are often gathered and eaten by fishermen and Indians earlier

Montreal
and Lizard
Islands.

Leach
island and
Gull rock.

¹³ Geol. Can., 1863, p. 82.

in the season. Sayers says that they incubate about the same length of time as common hens, and that the first fowls kept on Caribou island, a fishing station far out in lake Superior, were hatched by gulls from hen's eggs.

North of Leach island on the main shore patches of a basal conglomerate containing granite boulders were seen, probably of Keweenaw age, but no amygdaloids; though there is a curious rim of red agglomerate or ash rock dipping about 30° away from the upturned gneiss in a bay just south of Gargantua harbor.

Gargantua harbor is a picturesque bay south of the cape of the same name. It affords good shelter for fishing boats and the small steamers used in the fishing trade, including the Telegram, and could accommodate vessels of a much larger class. An island of rock rises in the mouth of the bay supporting a small lighthouse whose lamp is 85 feet above the lake, the only light between Corbeau point on Batchawana bay and Quebec harbor on Michipicoton island.

The rocks at the harbor consist of reddish granite or gneiss sometimes containing large masses or angular fragments of gray gneiss or schist, forming at some points almost a breccia. There are dikes of coarse pegmatite and of diabase penetrating the Laurentian rocks. A hill used as an observatory during the hydrographic survey of the coast by the United States government rises 431 feet a little to the north of the bay.

A fringe of amygdaloids extends along part of the shore and the small adjoining islands to the northwest of the harbor at cape Gargantua, resting directly on the gneiss without any basal conglomerate between. Many agates are found in the amygdaloid and as pebbles on the shore. The light keeper, Louis Miron, has found native copper also.

Gargantua river enters the lake south of the hook shaped promontory of the cape, but as it does not seem to be a very important stream it was not ascended as far as the falls or rapids.

Just north of the cape there is a small patch of red Keweenaw conglomerate and

also of red volcanic breccia at the foot of a bay, remnants of a sheet of rocks once covering the whole shore and perhaps still existing below the level of wave action.

A cascade 90 feet high is seen close to the shore a little farther north, and fine mountain scenery all the way from Gargantua to the wide flat valley of Michipicoton river.

Only a short stay was made at Michipicoton Post near the mouth of the river, as it was intended to examine the gold region near Wawa lake to the north on our return journey.

The rocks at Little Gros Cap, five miles west of the river mouth, and near Doré or

Pickering river just beyond, were included by Logan in his original Huronian, and were studied by

us for a day or two because of their geological interest; and Doré river was ascended for about two miles to examine its falls and rapids. The river is very bad for canoeing and cannot be much used, since only the first fall has a path cut for portaging. The first fall, which is close to the shore, is only about 20 feet high, but less than a mile above there is a fall of 78 feet (aneroid, two readings), and the height reached in two miles is about 310 feet. In this distance we were obliged to make six portages, mainly over rock; and the river at one place flows through a small canyon not more than six feet wide.

The rocks observed were boulder conglomerate near the lake and felsite schist with

a few bands of chlorite schist to the north as far as we proceeded, all

Huronian. A high steep hill near the mouth of the river consists of diabase, probably a mass erupted through the Huronian. The strike runs from 60° to 80° east of north, and the dip is from 70° to vertical. The schist conglomerate at the mouth of the river has been described by Logan, who gives a detailed section having a width of 1,700 feet, and states that the series of slates (schists) must be much greater than this. A micrometer measurement to a small island of the same rock nearly south of the river mouth gives the distance as 2,500 feet, and the conglomerate has been found $\frac{1}{3}$ of a mile inland, or 650 feet farther. These conglomerate.

Little Gros
Cap and
Doré River.

Schist Con-
glomerate.

Gargantua
Harbor
and River.

erates, which are very like those of Shoal lake in the west, extend in patches for about three miles along shore toward the west, and contain a few barren looking quartz veins. Still farther west granite cuts off the schist conglomerate eruptively, and is followed by green schist. More or less conglomerate occurs at intervals however as far as Dog river.

Dog River.

For three or four miles east of Dog river a magnificent series of old lake terraces fronts the shore, best seen from a mile or two out in the lake. They are clean cut and very well defined, and consist chiefly of sand and gravel. The highest rises about 360 feet above the river, and the even level lines of the forest-covered surfaces of the successive steps are very striking in contrast with the rugged cliffs and dome-like mountains elsewhere seen on this wild coast. These terraces extend only a short distance west of Dog river. Two miles west of the river there is a sheltered little harbor, well adapted for fishing craft, though deserted when we were there; and a few shanties stand along the sandy shore of the bay and near the rocky point which protects the small pier and storehouse.

As Dog river is one of the largest streams on this part of the coast we devoted some time to its study. There is a long gravel bar at its mouth, crowding the brown water of the river against the cliff on the west gide of the valley. About half a mile above this the river becomes too rapid for canoe navigation, flows through canyon-like narrows parallel to the strike of the Huronian schists, and finally turns off at right angles, forming one of the most beautiful falls we had yet seen. The foot of the main fall is about 33 feet above the lake, while its head is 159 feet higher (aneroid). The fall is in three steps, but all visible from one point of view. Above the fall the stream once more turns parallel to the strike of the schist, following a narrow canyon. From the appearance of the shores it is evident that the river has great fluctuations in level. The rocks seen are pale green schist conglomerate and porphyroid.

A View of old Lake Terraces.

In this and rivers visited before, speckled trout are plentiful, sometimes the real brook trout. Our captain caught several fine fish from the pier in the harbor, one measuring 19½ inches in length. The red spots are not so bright as in the brook trout, and are surrounded by a small bluish halo; otherwise these fish are very much like the brook trout in appearance.

West of Dog river to the mouth of Eagle river various green Huronian schists are found, penetrated often by felsite dikes. West of this a reddish or gray granite mass bursts through the schists and is itself cut by dikes of diabase.

Pucaswa River to Pic River.

Our next important stop was at Pucaswa¹⁴ river, where two small islands form a tiny harbor, very welcome after long pitching in a high sea; and a stretch of sandy shore affords good camping ground, though infested with sandflies and blackflies. The rocks here are chlorite schists with purplish felsitic layers, crossed by numbers of large diabase dikes having the crumbling look of Keweenawan rocks, though perhaps not of that age. One of these dikes, forming a point just west of the river mouth, is cut by a smaller columnar dike, which has been breached by the waves so as to give a tunnel-like opening through the point. The cave is about 30 feet long by 15 in width and height. The basaltic columns are six feet long and tilted to about 45° on both the roof and floor of the cave.

There were many fresh caribou tracks on the sand near the mouth of the river. For about a third of a mile beyond the bar there is little current, but there the valley turns off through a wild gorge overhung by a cliff hundreds of feet in height. A portage path of half a mile leads past the series of cascades by which the stream breaks through this barrier, the only well beaten portage found on the whole river. The first fall is of about 55 feet, and a series of rapids rise beyond this. There is a mass of pyrites

Geology of Pucaswa Harbor.

Cascades of the River.

¹⁴The name is variously spelled, Pucso, Pukasquaw, etc., but the spelling followed here corresponds best with the pronunciation of the Indians employed as guides, though one of them spelled it Bagoswa when asked to write it down.

a foot thick at the foot of the rapids, at which some one has done a little work ; but there is no quartz accompanying it, and the deposit shows little promise.

A little west of Pucaswa granite shows itself as far as Kilkenny (or Killarney) harbor, At Kilkenny Harbor. now deserted ; beyond which there is gneiss with a strike of about northeast and southwest and a dip of 80° to the northwest. In a bay west of Kilkenny there are several old beaches rising above the water to a height of 42 feet, the upper ones completely lichen-covered. There is no sharp break in the series of beaches, which all consist of well-rounded boulders about as large as one's head. This seems to imply a gradual fall in the level of the lake.

Between this and Otter head the scenery is very striking, pale gray or flesh red gneiss being penetrated by many wide diabase dikes of a very columnar character, often, when weather-beaten, suggesting great piles of cordwood. As the head is neared the gneiss becomes interbedded with long bands of gray or green schist, showing an eruptive contact of Laurentian with Huronian, like that seen in the Rainy Lake region.

There is a long bay with mountainous shores to the north of Otter head, and a large island protects its mouth, so that the sheet of water is as placid as an inland lake, forming a great contrast with the turbulent waters of lake Superior, which are seldom free from ground swell even in the calmest weather. On the north shore of the bay, where a waterfall tumbles over a dike of diabase in green schist, a mining location was taken up some years ago by Mr. Mudge, of Peninsula. There are some small veins of quartz charged with pyrites, supposed to contain copper, but showing when assayed no copper and only \$2 per ton in gold and silver ; so that nothing further has been done with the property.

On the main land opposite Otter island the Rideau river falls as a cascade visible for a long distance on the lake. The Dikes of Otter Head. There are two falls in succession, having in all a height of 86 feet.

From this point to White Spruce (or

Spruce) harbor no stop was made. At the latter point there is a well-sheltered bay, once a fishing station, but the White Spruce Harbor and Tip Top Mountain. frame houses, pier and storehouse are now abandoned. From here we attempted to ascend Tip Top mountain, marked on the map as seven miles to the east, but owing to the shortness of the afternoon available for the work and the heavy rain which came on, we did not succeed. The trail is faint at present, though it must have been considerably used when the summit was occupied as a triangulation station by the U. S. Hydrographic Survey. The blazed trail as far as we could follow it leads up a small creek past a lake about a half mile long and then up an extraordinary ravine or canyon, evidently the result of the weathering out of a diabase dike. Though only a few feet wide it had a depth of about 100 feet, with smooth parallel walls of granite both having a dip of 80°, so that one wall completely overhung the path. On an adjoining granite hill top at a height of 982 feet (aneroid) we found an old triangle of poles, perhaps used as a temporary observatory or signal, and had a magnificent view of the mountainous country around, though somewhat shrouded by mist and rain. A high point, or rather dome, three or four miles to the east was probably Tip Top¹⁵ ; and a number of higher hills than the one we had climbed were in sight, ours representing not much more than the average height of this part of the shore. No land of any extent fit for agriculture was passed on our excursion.

The rocks observed were granite or granitoid gneiss, with diabase dikes. At Spruce harbor the rock is gneiss imperfectly foliated, with no very distinct strike. On a small gull rock three miles to the northwest we found gneiss with a strike of 80° and a nearly vertical dip. A young gull picked up here, though not yet able to fly, had a spread of wing of 45 inches. All the gulls were fledged or nearly so at this time, and their islet was very foul from the debris left upon it.

¹⁵ This mountain was ascended on my return journey going in from Swallow river to the south.

A short stay was made at White Gravel river, a small stream north of Spruce harbor, and a longer one at Oiseau bay ten miles north of it. Unlike the coast observed hitherto, we found that along this part a number of points had been burnt over, as if the climate was drier than nearer to the Sault; and the lofty hills along the shore had a very barren look. The only timber of value is spruce, both here and on the route of our excursion towards Tip Top mountain. Of that, however, there is a considerable quantity. At Oiseau bay there is an interesting succession of rocks displayed. Yellowish Laurentian gneiss, containing black bands of older schist, probably Keewatin, is cut by gray granitoid gneiss, and all of them are intersected by pegmatite. The gneiss has a strike of 150° , but a mile beyond this it has changed to 60° .

From this point to Heron Bay the shore as far as observed by us consists of green schists cut by dikes of granite and larger areas of coarse reddish-gray granite, perhaps Laurentian.

At the mouth of Pic river sand bars and dunes form the shore; but just beyond this a rocky point consists of what appears to be Huronian schist, with a strike of 110° - 120° and vertical dip. Rounding the point and turning north into Heron bay there are reddish rocks, at first taken for gneiss or granite, but proving on more careful examination to be schist conglomerate, consisting of pebbles or boulders of quartz porphyry and other rocks in a darker matrix. This rock forms almost the whole shore of the bay.

Heron Bay.

At Heron Bay we were delayed a day or two in getting guides and canoe men for our projected trips south from the C. P. R. to lake Superior, owing to the fact that all the Indians of the reserve were waiting for the most important event of the year, viz., treaty payments. After our lonely journey along the deserted shore of lake Superior where for about 70 miles, from Ganley's harbor to Heron bay, there is not a settled inhabitant, the bustle was not uninteresting.

A day was spent in walking along the railway to Peninsula to examine the rock

formations and to visit the immense gravel deposit on the way. West of Heron bay to Iron Bay mile 805 the schist conglomerate is found; beyond that, greenish gray slate with many dikes of diabase. As the rocks near Peninsula and along the railway for some distance west were referred to in a previous report, no mention need be made of them here.¹⁶ The iron sands referred to in the same report,¹⁷ were examined under the guidance of Mr. M. J. Paterson of Toronto, who was engaged with Mr. Mudge in collecting bags of the material for a test of the value of the deposit. The area of sand containing magnetite is large, 1,200 acres we were told. An assay of one of the best samples taken by us yielded 48.6 per cent. of iron. The Heron Bay mine close to the station of the same name was visited also.

A shaft 40 or 50 feet deep has been sunk in a country rock of felsite; and the ore on the dump consists of calcite with a little quartz and pyrite, not very promising in appearance.

Pic river is one of the largest on the north shore of Superior, and has falls of some importance, but too far inland to make it advisable to ascend it for the purpose of examining them. Where the railway crosses the river half a mile east of the station its width is 225 feet. The water at the time we visited it was exceedingly muddy, justifying the name, which is said to mean "mud" in Ojibway.

Michipicoton Mining Division.

By the kind aid of Mr. W. H. McDougall, a fur trader who has a store at White River as well as at Heron Bay, Indians and equipment were secured for Prof. Willmott and myself, and on July 20 we commenced our respective journeys southward, my starting point being Breckenridge Station of the C. P. R.; Prof. Willmott's, White River. It was arranged that Mr. George should accompany Prof. Willmott, and Mr. Coulthard and Sayers should sail the Caribou down to Caribou island while we were occupied with our canoe trips, so as to examine the rocks composing that seldom-

¹⁶ Bur. mines, 1897, p. 133. ¹⁷ Ibid. p. 83.

visited island; and then to return to the north shore and pick us up at the mouth of Pucaswa and Dog rivers, respectively. This programme was carried out punctually by the three expeditions.

Bremner River.

Going east by rail from Heron Bay to Bremner river my party of four, including two Indians, Toussaint Weesiaun and Jim Shoes, engaged as canoeman, set out on

Bremner
Station to
Lake
Superior.

July 20 through a region only partly known to the Indians and rarely

traversed by a white man. We were told it would require two weeks of hard work to cover the distance to lake Superior, about 45 miles in a straight line; but of course much farther by the small and winding rivers we were to follow. It required in reality only about half that time, although the carrying on of the survey with prismatic compass hindered our progress considerably. Bremner station is on White river, but a quarter of a mile up stream we turned off to the south

on Bremner river, which seems the larger of the two branches, and followed it up to its head waters which reach more than half way to lake Superior.

About four miles up the first rapid requiring a portage is reached, and the first outcrop of rock also occurs, gneiss with an east and west strike. The portage, which is on the right bank going up, is about a fifth of a mile long and well beaten. The rise is about 10 feet. The next rapid, about a mile farther up, has a fall of 32 feet (aneroid); and is passed by a crooked trail on the left side about three-quarters of a mile in length. Another rapid is passed less than a mile beyond, with a fall of nine feet and a portage of 100 yards on the right side. The rock exposed here is gneiss with dikes of diabase. A large creek enters the river from the left about 12 miles from Bremner, in a region of low sandy banks; and half a mile beyond this hills that have been burnt over were found to consist of fine grained pale gray granite, covered with the black trunks of jack pines.

The timber up to this point on the river is chiefly jack pine, though on the lower ground some spruce and tamarac are to be seen. My cook, Stephen Jollineau, who has worked for

a pulpwood lumber company, says that the spruces would make good pulpwood, each tree cutting two logs 16 feet long.

Above the last rapid mentioned the river grows smaller and very crooked, and has only a gentle current. Several small rapids follow, with short portages scarcely at all beaten, over gneiss or granite; and then a bad portage one-third of a mile long over fallen timber past a series of rapids having a total fall of 60 feet (aneroid); and from this on there are numerous small rapids with slack water between.

About 23 miles from Bremner the river suddenly becomes straight for about two miles, much of the way having a steep granite or gneiss wall on the left bank. The straight part probably follows the line of a diabase dike which has weathered out, forming a long canal. At a rapid having a fall of 32 feet the stream is at one point so narrow that one can easily step across. The channel follows the strike of the gneiss.

The stream now grows more crooked than ever for two or three miles, and then straightens again for about the same distance, three small creeks

entering it meantime from the east.

After another bend and a tiny lake expansion we at last reach the headwaters of Bremner river in a lake about a mile in length, called by the Indian family which hunts over this region Peenay or Partridge lake. The lake is surrounded by low rounded hills of granitoid gneiss, the highest rising perhaps 100 feet above it. The pale gneiss includes many angular fragments of dark green schist.

The whole rise from Bremner station to Partridge lake, as determined by summing up the heights of the different rapids measured by aneroid, is about 200 feet. As there is very little current between rapids only a few feet need be added to complete the elevation of the headwaters of Bremner river above the railway. As Bremner Station is 527 feet above lake Superior, the fall from Peenay lake to Superior is 725 feet.¹⁸ Toussaint, who

¹⁸ Mr. J. White of the Geological Survey has kindly informed me that the elevation of Bremner station above sea level is 1,129 feet. Subtracting 602 feet, the height of lake Superior above the sea, gives 527 feet.



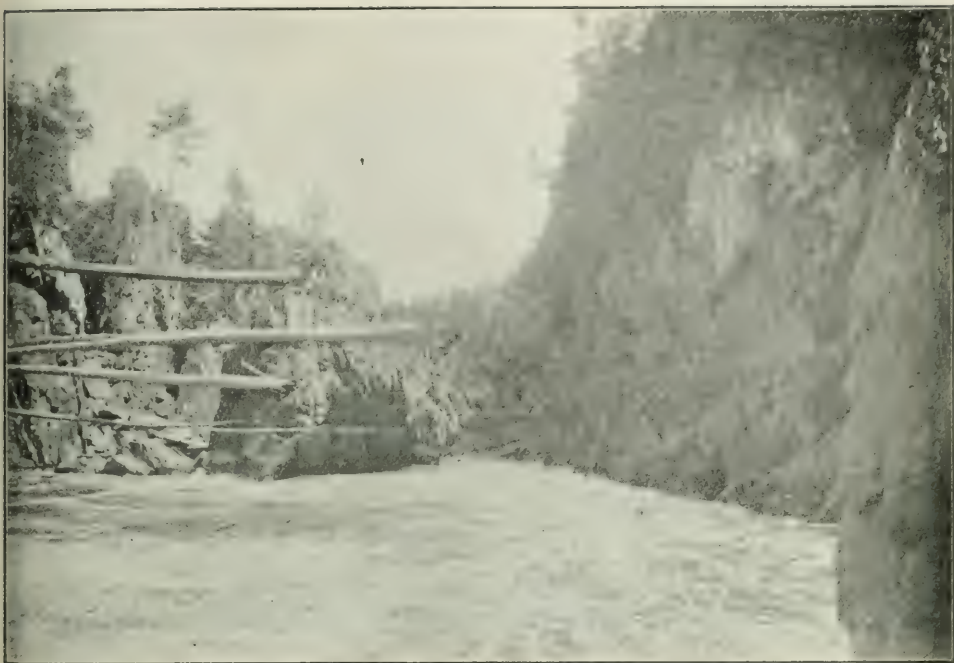
Dikes of Greenstone in Quartzite at Island one mile east of Bruce Mines

—Willmott



Murray's Lower Slate Conglomerate, showing a Gneiss pebble, a faulted pebble, joints and glacial striae.
Palladian Islands, four miles east of Bruce Mines.

—Willmott



Gorge of Mississauga River

Cheney.



Baboon Falls on Mississauga River.

Cheney



Shaft House at Cheney Mine.

-Cheney.



Steam Shovel excavating Gravel Beach back of Garden River Station, C.P.R.

Willmott.



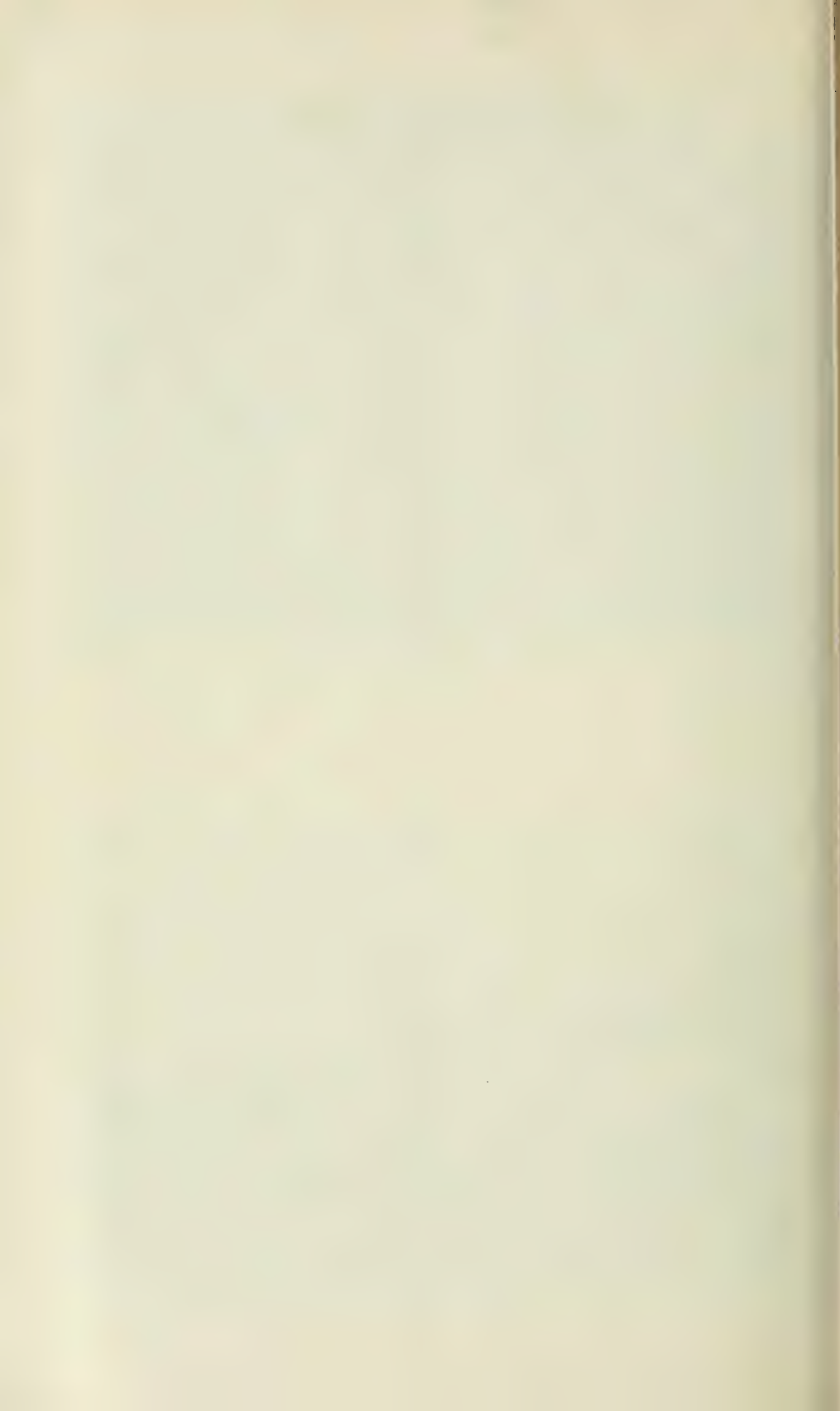
Mill and Rock Dump at Victoria Mine, Garden River.

Willmott



Cascade Mill at Garden River, showing crushings in foreground

Willmott



hunts along this valley, states that a lake a mile or two away empties by a small creek into Partridge lake and also into the headwaters of Pucaswa river.

The scenery of the river is not striking. Much of its shores has been burnt over, and the timber left is of little value except for pulpwood. Jack pine, birch and spruce are the commonest trees; but tamarac and cedar are found occasionally. There are unusually few lakes along the stream, and those are scarcely more than pond-like expansions of the river. The shores being generally low, afford few exposures of rock except at rapids; and the only rocks observed are granite, gneiss and dikes of diabase.

Pucaswa River.

A portage $2\frac{1}{4}$ miles long, broken however by three little ponds, leads southeast, across very rugged and hilly country with no distinct path, to a small creek flowing into Pucaswa river. The fall from Partridge lake to canoeable waters flowing into the Pucaswa is 126 feet. Much of the portage leads across flat-topped granite hills over bare rock; but there are long stretches of muskeg and meadow as one approaches the lower end of the portage. The hills were covered with blue berries when we crossed on July 23; and the Pucaswa waters provided us with plenty of speckled trout.

The little creek at which the portage ends joins a larger stream which flows $2\frac{1}{2}$ miles southwest to meet the main Pucaswa river flowing first west and then southwest. After crossing the divide there were no beaten portages and we simply worked our way down stream over endless flat rapids, wading much of the time. The reason why the Indians never navigate the river was clear, although the presence of caribou tempts them to the headwaters of the Pucaswa in winter. Beaver cuttings were plentiful on this part of the river.

A few miles below the forks the stream divides, enclosing a wooded island a mile and a half in length. About 15 miles above its mouth the shore at a rapid shows many black masses of hornblende schist, probably Keewatin in age, the first rock other than Laurentian gneiss observed on

the river. The gneiss thus far seen generally strikes about east and west. With the exception of a few narrow lake-like parts, the river down to this is almost a continuous flat rapid with a few higher falls, the portaging being done generally down the bed of the shallow stream; only striking into the woods where falls of some height occur. About 11 miles from the mouth red granite or gneiss is seen at a rather lofty fall (27 feet) and continues for some miles down stream. Below the main fall there is a continuous series of rapids for a mile and a quarter with a fall of 198 feet; a difficult bit of river with such precipitous rock walls as to make portaging very laborious. This part of the river contains many elongated islands among the rapids, and presents a series of magnificent views. Here for the first time a distinct sand and gravel terrace indicating an old lake level is to be seen rising 40 or 50 feet above the river, and the valley has been cut low enough into the high tableland to give its rocky walls the appearance of mountains.

A little more than seven miles above lake Superior, following the windings of the river, here very crooked, but only three miles in a direct line, Huronian rocks first show themselves in continuous beds, having a strike of 80° or nearly east and west, and running parallel to the course of the river. The dip is from 30° to 45° to the north. The red granite observed for several miles above this is probably eruptive, perhaps a continuation of the granite area found on the shore of Superior a few miles east of the mouth of the Pucaswa. The strike of the green schist varies somewhat, being 60° a mile lower down.

About $4\frac{1}{2}$ miles from its mouth the Pucaswa is joined by a smaller river from the left, estimated at a quarter of its volume. Just above this there are two falls having a total drop of 22 feet, and near by a small bedded quartz vein with pyrite was observed. A mile below the tributary felsite schist occurs, having a strike of 30° and dip of 30° to the northwest; and the river passes through a canyon where many dikes of diabase are seen. Below the canyon there is a soft gray rock much seamed with small veins of calcite. A succession of flat rapids

and one fall of about 18 feet intervene between the canyon and the main fall of the river, 55 feet high, below which there is a lake-like expansion reaching to the bar separating the river from lake Superior. The river mouth has been described in a previous part of this report.

There is a considerable amount of spruce, some of it large on the lower reaches of the Pucaswa river; but besides the timber nothing of economic importance was observed on the whole route from Bremner to Pucaswa harbor. Summing up the results of aneroid readings from the foot of the long portage which leads from Partridge lake to a tributary of the Pucaswa, the whole fall is 575 feet. As there is a fall of 126 feet on the long portage this gives the elevation of Partridge lake, the headwaters of the Bremner river, as 700 feet. This result must not be looked on as having great accuracy however, and the estimate made from Bremner station, 725 feet, is probably more correct.

The Pucaswa as a whole is one of the most difficult rivers in Ontario to navigate, being almost a succession of rapids, some with very shallow water over small boulders; others are considerable falls over solid rock. There are few stretches of dead water and no lake of any magnitude on its whole course. Since the Canadian Pacific Railway crossed the country to the north it is never navigated even by Indians, though we found two families of Indians camped at the mouth of the river for fishing purposes. They came from Pic river in a sail boat however. In winter the country is more accessible than in summer, and a few Indians hunt caribou along parts of the Pucaswa.

The roadway surveyed by T. W. Herrick in the summers of 1857-9,¹⁹ running about 20 miles inland through the whole region from the Sault Ste. Marie along the north shore of lake Superior, was apparently never cut out, and will never be made use of since the railway has been carried through the northern part of the district. His work seems to have grown up so as to be unnoticeable from the river. The

Readings of
Elevation.

An inhospitable
Region.

Herrick's
Roadway
Line.

line is mapped as running past the headwaters of the Pucaswa; but was not observed by my party in portaging from Partridge lake. He represents the river on his map but makes it straight except at the lower end, probably having sketched it in from the reports of Indians. For a few miles above its mouth the Pucaswa is fairly well mapped in the plan of the township of Homer in the Crown Lands department. Bremner river and Partridge lake are not shown by Herrick, though his line must have come close to them.

Bell's map of the "Basin of Moose River and Adjacent Country," illustrating his work in 1875, 1877 and 1881, and published by the Geological Survey in 1883, does not make use of Herrick's work. A tributary of White river, Oskabookuta river, is dotted in, probably from Indian reports, in such a way as to make it meet or even cross Bremner river near its headwaters. It is probable that the river is not as long as represented, as my Indians, though they had canoed ten miles up it from White river, were not aware that it approached Bremner river.

Twenty-seven years ago two townships were surveyed on this part of the barren shore of lake Superior, Homer and Byron, and the old lines may still be seen in the woods. As the history of the affair, which included the "salting" of a tin mine, is of some interest, Mr. John McAree, who took part in the survey, has been asked to write an account of it. This is given in the footnote.²⁰ In later times deposits of copper ore have been found in or near these townships and may prove of value.

The Story of
a "salting"
Swindle.

²⁰ McAREE'S NARRATIVE.

The township of Homer was surveyed by the late C. C. Forneri, P.L.S. of Port Arthur and the writer in December, 1871, and January, 1872, for W. A. Northrup, who came to Port Arthur from the south shore of the lake—from Houghton if I remember rightly—in the summer of 1871. We went down by the Manitoba, Captain Symes, on November 30 and left the survey on January 24 on the return trip. Our route was around the north shore, and the transportation of our baggage, etc., was by toboggans made in the bush before starting. We reached Port Arthur on February 17. We then learned for the first time that we had been making a survey of lands upon which valuable deposits of tin ore had been discovered the previous season. In those booming days of sur-

¹⁹ Upper Canada Surveys, 1860-66.

White River.

Prof. Willmott, who ran a micrometer survey from White River to the mouth of Dog river, reports as follows :

" Leaving Dr. Coleman at Heron Bay, Mr. George and myself proceeded by train to White River, where supplies were purchased. Two Indians, Alexander Matchinini and William Pansway, were engaged as canoemen and proved very satisfactory. By the kindness of Mr. W. H. McDougall I was provided with a bark canoe, tent, extra compass and some of the necessities of a camp, which were returned by the canoemen two weeks later.

veying and taking up mining claims many of the operators thought it necessary to conduct their operations with as much secrecy as possible, and for a member of a survey party to have asked any questions as to the exact destination of the expedition, or the nature of the mineral discovery, would have been resented as being very ill bred. Homer Pennock, also of the south shore, and a man named Johnston posed as the discoverers of the tin; whilst Northrup and Wood were the vendors, and sold the discovery to a syndicate of Detroit mining men, who organized a company, paying Northrup's crowd part in cash and part in stock, besides buying the land from the Government and paying the survey and all other expenses. During the winter the Northrup party quietly disposed of their stock, much of it in Boston, I believe, and other eastern cities. In the spring the writer and Mr. Forneri's assistant went back to Homer and made the survey of the shore line, and of some additional sections which were added along the east boundary of the first survey. The Detroit company were now in charge in the person of Captain Slawson, a western mining man. Pennock came on the ground, staying at Slawson's camp, but although he made excursions into the woods to the supposed tin vein, he absolutely refused to show its location. Slawson, in my hearing, offered one of the survey party who had been on the original survey one thousand dollars if he would show the vein; but this person knew no more of it than Slawson himself. Pennock went back to New York and the tin company took proceedings which resulted in his being incarcerated in the Toombs. He then said that the survey had not been properly placed to take in the discovery, and that if this error was rectified and an additional tract, which he indicated, surveyed, he would show the tin. Accordingly, late in the autumn of 1872, the writer again visited Otter head with Isaac Traynor, lately out of his apprenticeship, as assistant, and surveyed the township of Byron, adjoining Homer on the north. During the progress of this survey, which was directed by Northrup in person, he and his confederates made preparations for the culminating of their swindle by fixing up a vein containing quantities of tin oxide. This was not known to any of the survey party at the time, for Northrup requested us not to go near the place. A Mr. Childs of Duluth had charge of what proved to be the "salting" operations. No one as yet suspected that a swindle was being perpetrated. Upon the completion of

" White River is a divisional point on the Canadian Pacific Railway, 304 miles west of Sudbury. It is a village of about 300, dependent almost entirely on the railway. Two other industries are the collection and shipment of \$10,000 worth of fur yearly, and the manufacture of cold weather statistics. White River enjoys the unenviable reputation of being the coldest place in Ontario reporting to the Meteorological Department. Nevertheless the observer finds farming profitable and I noticed that the blueberries were fully two weeks earlier than on lake Superior, 40 miles south and several hundred feet lower.

the survey the writer returned with his party to Port Arthur. Later the report came that the tin vein or veins had been visited and inspected by Captain Harris of Ontonagan, Mich., the expert appointed by the syndicate to make the examination, and that his report was favorable—it was all right. A good deal of stock was sold as the result of Harris' report, for he was a man of undoubted integrity, a Cornishman who knew tin ore when he saw it, and who had had a very successful career in copper mining on the south shore of lake Superior. The vein was seen on the east side of Otter cove, and also crossing the point of land on the west side of that sheet of water.

Early in the spring of 1873 people from Fort William and from Silver Islet went down to Byron and discovered the fraud. I believe Captain Pritchard of Fort William was the first to see that the vein was bogus. A survey party from Silver Islet was then at work taking up what they believed would prove to be valuable tin mining lands; their operations came to a sudden stop when the truth became known.

The circumstances under which Captain Harris' examination of the property was made should be mentioned in justice to him. It appears that on his way to Otter head he arrived at Sault Ste. Marie late in November, if not actually in December. No steamer could be got to take the party to Otter head, where the vein of tin ore was to be seen, and they were obliged to engage a schooner. Arrived at Otter head they found six inches of snow on the ground, and very soon after their arrival the skipper of the schooner discovered the near approach of a storm, and as there was poor shelter where he was, and the season very late any way, he insisted that the mining party should hurry their work, if he was to wait for them. Harris, I suppose, on being able to pick the tin ore out of the vein that was shown him, took the rest for granted; he may not have been an hour absent from the craft, and in that chilly and dreary November weather may have been taking a little too much stimulant, or may have been betrayed along that line, as has been reported, by the interested parties who had him in charge. It was subsequently ascertained, I believe, that the tin ore for the "salting" was procured from Cornwall.

The total amount of land in these two townships is about 30,000 acres, I think; the price of mineral land at that time was one dollar an acre.

JOHN McAREE.

"Our course lay east for two miles along the railway track, which here crosses the White river a number of times.

Ascent of White River. The river is rapid, so that we found it easier to transport our provisions along the track to a point one-eighth of a mile west of mile board 744. Here we began a track survey with micrometer telescope and compass which was carried to the mouth of Dog river.

"The route begins with a portage nearly half a mile long over Laurentian gneiss. Then we launched our canoes in the White river and ascended it in an almost due south direction for a distance of seven miles. Two more portages had to be made, one of 600 feet with a rise in the river of 12 feet; the other half a mile long around two rapids where the river rises 13 feet. At the south end of this portage the rock is a gneiss with Keewatin-like inclusions, both cut by dikes. Two miles and a quarter south similar Keewatin-like inclusions were noticed in the gneiss.

"Seven and a half miles south of the railway a sluggish stream enters from the south. The White river itself has little current except at the rapids mentioned. For much of the distance it flows in a marsh with rocky hills one-quarter to one-half mile apart. From this point to the railway I made the total fall 65 feet by aneroid. The hills are low and burnt, and thickly strewn with boulders, mostly granitic.

"One-fourth of a mile up the tributary stream, Pokay lake was reached. Its extreme length north and south is

Pokay Lake. three and a half miles, its greatest width one and a half. On its western side another small band of Keewatin included in gray gneiss was seen. The shores of the lake on the north and east consist of burnt tamarac and spruce swamps; to the south and west are some hills.

Dog River.

"From the extreme south of Pokay lake a portage nearly a mile and a half long leads over the height of land to the headwaters of the Dog river. The trail, known locally as the Mountain portage, is at its summit 300 feet above Pokay lake. The path is steep and stony in places and burnt

logs are too frequent for comfort. The lake to the southeast of the portage is known to the Indians as Clear lake, but as this name is becoming too common for convenience I have designated it as McMaster lake. It is about a mile and a half long and surrounded by spruce. This lake, the headwaters of the Dog river, is 786 feet above lake Superior and 145 feet above the White river at the C. P. R. crossing at mile board 744. An unnavigable creek runs from the northern end into University lake, two-thirds of a mile to the east. The trail is level and dry and may be crossed in fifteen minutes. One mile and a half southeast of University lake a marshy channel may be followed by which half a mile of paddling may be avoided. From University lake to Obatonga lake, a distance of five miles, the river meanders through a marsh with little current. Occasional rocky islets consist of gray gneiss.

"Obatonga or Sand-bar lake is a little over three miles in length from northeast to southwest and from a half to three-quarters of a mile wide. It receives its name from the sandy peninsula and island which nearly divide it in two. To the north it is surrounded by low rounded hills of gray gneiss. A portage route leads from the north end to Amyot on the C. P. R. At the outlet is a small rapid where the river descends two feet. Thirty feet above is a small plain with well-rounded gravel which can hardly have been made by the river.

"Three-quarters of a mile below is Knife lake, a fine body of water a mile and a half in diameter. About the middle of the western side on a small island there is an inclusion of green schist striking 100°. A mile and three-quarters south of this the true contact of the Laurentian and Huronian was found. The stream on leaving Knife lake is rapid for a mile, falling 33 feet. To avoid this a short portage was made to the east into lake George, a shallow sheet of clear water three-quarters of a mile long. Half way down it the gneiss becomes granitoid and then appears in eruptive contact with the green schists which strike 85° to 90°. Twenty-five miles to the east, on the Magpie river at a similar contact, the strike of the schists

is 88° and this is probably a continuation of that band ²¹.

"An unused trail of one-sixth of a mile leads from lake George to the river. Numerous quartz seams of small size were seen in the schists for some distance. Two miles and a half below, a portage of one-third of a mile occurs. A half mile below is a gold

McDougall's prospect belonging to W. H. McDougall of White River. A small amount of stripping has been done, exposing a bed of solid quartzite 15 feet wide and perhaps as much more mixed with schist. The quartz is rather glassy, but contains a considerable amount of pyrites, which on the surface has weathered to hematite. An altered quartz porphyry adjoins the chlorite schist on the north, the strike being 90°. A short distance below a much stretched schist conglomerate occurs. South of this is a sheared quartz porphyry in contact with a hornblende schist. A prospecting pit in the latter proved of no value, the quartz seams soon disappearing. A mile and three-quarters below McDougall's camp a stream comes in from the north. On a lake at the head Mr. McDougall informed me that he had found iron. In the absence of a guide it seemed useless for us to attempt to find it.

A difficult reach of River. "From here to lake Superior the Dog river is not now travelled, even the Indians avoiding it on account of its numerous rapids. So far as I could learn but one white man had ever been down it to its mouth—a C. P. R. engineer who investigated it as a possible route into the interior. Seven miles below McDougall's, an old Indian route to lake Superior by a chain of lakes branches off on the west. Even this has fallen into entire disuse. From this point we had to make our own portage paths, and they were very numerous. Every few hundred yards there was a rapid stretch of water filled with angular fragments of rock, which made it impossible to take a canoe down with safety. The stream becomes very crooked also and our telescope sights were shortened to a few hundred feet. The higher falls have been marked on the map.

"A short distance below the portage route to Superior gray gneiss striking 120° was

observed, though the exact contact was passed. Over two miles below pieces of Keewatin green schists were found included in the gneiss, so the contact is doubtless an eruptive one. A little farther on the river has excavated a narrow gorge in a band of included schist, gneiss forming both banks.

"Numerous pot holes have been made by this turbulent stream. One measured 10 feet by 12, and was six feet deep.

A more striking one was perfectly round, 11 feet in diameter and 23 feet deep. A flat rock just at water level formed three-fourths of the circumference.

"Ten miles from lake Superior the water of the lake was visible from a hill top. Eight miles north of Superior a very considerable stream comes in from the east. One mile and a half to the

Lower stretch of Dog River.

southeast a very schistose gneiss occurs in eruptive contact with the green schists. Both are cut at right angles by a dike of greenstone 10 feet wide. Near the contact are a number of bedded quartz veins, one 15 inches wide. A mile and a half below the contact large felspar crystals were noticed in the schist, which dips 45° north. Just south were numerous quartz veins, one three feet wide. Two miles from its mouth Dog river flows through a narrow gorge for 800 feet parallel to the strike, then turns at right angles and in several fine cascades plunges down 159 feet. The portage we cut around this fall crosses several well marked terraces, continuations doubtless of those measured a few miles to the east on the shore.

Denison Falls. The name Denison was given these falls by Messrs. Herrick, Tight and Jones, who described the geology of the shore in 1886.²² A band of schist conglomerate which occurs at the lower fall was found with the same strike 140° about a half mile east of the mouth of the river."

Tip Top Mountain.

Having reached the mouth of Pucaswa two or three days before the expected time, and knowing that the Collingwood fishing boat must pick up Prof. Willmott at Dog river before coming for me, I decided to coast northwest to the mouth of

Swallow River.

²¹ Bureau of Mines VII. p. 200.

²² Bull. Sci. Lab. Denison Univ. II., 1887, p. 119.

Swallow river and make another attempt to climb Tip Top mountain, probably the highest point in the Province of Ontario. At the mouth of Swallow river a small outcrop of conglomerate, very like the basal conglomerate of the Kewenawan was found, the most northerly we observed. It filled a small ravine in granite and contained boulders of the same rock. It looks as if lake Superior is now just finishing the work of exposing the ancient Pre-Cambrian shores by eating away all the softer rocks, leaving the Archaean basin as it was in long past days. There is a beautiful fall less than a mile up Swallow river, where the river springs 80 feet in almost a single leap over a wall of granite. As the river is shallow and full of rapids, my guide, Toussaint, thought it better to go on foot to the mountain, situated on the chart about 10 miles to the north.

Our path, which was crooked and often hard even for an Indian to follow, led over rough hills and valleys for about seven miles, when we once more touched the shore of Swallow river.

Our course was considerably east of north. Here a night camp was made by one of the Indians, while the rest of us went north about five miles over rougher country than before. The mountain has a dome-shaped top and consists of Laurentian granitoid gneiss, with dikes of pegmatite and also diabase. A large mass of fine grained diabase forms the highest point. Some massive flat stones mounted on others in a way suggesting a rude altar probably served as bases for instruments during the American hydrographic survey, when this was one of the stations. The surrounding valleys are covered with thick forest growth, and most of the neighboring summits are covered with fair sized trees to the top, except where precipices are too steep to give them foothold; but the summit of Tip Top is covered with bushes only, or perhaps one should say with very stunted trees, none rising above 20 feet. The kinds observed were spruce, birch and mountain ash. It seems as if the unchecked violence of the wind and storms must cause the stunting, for the height, as found by aneroid checked for change of barometer, is only 1,525 feet above lake Superior, or 2,125

above sea level, far below tree line for other mountains at this latitude. It can hardly be due to cold, for blueberries were much riper on top of the mountain than on the lake shore 1,500 feet below. The view from the summit is fine, though not so fine as that from lower points ascended near the lake, where the sharp bare cliffs are so effective.

The general appearance is of rolling hills with a few slopes of bare rock, the only real precipices to be seen lying north of Spruce harbor several miles away.

There is very little burnt country within the field of view, but little of the forest is of value except spruce for pulpwood, of which there appeared to be large quantities. No plains or terraces of cultivable land could be seen except a few small beaver meadows; nor were any bodies of water disclosed except three ponds, and the wide expanse of lake Superior seven miles to the west. It is doubtful if this region will ever support a population beyond a few fishing stations and a town or two working up pulpwood near some of the large waterfalls.

A young caribou was seen on the way to camp, and these animals appear to be common. My Indians say they eat

"moss," the gray arborescent lichen of the rocks; various herbs, some of which they pointed out, and mud! They certainly paw the moss away and leave bare spaces, probably not for the earth but for roots or bulbs of small lily-like plants to be seen growing about. They are said not to eat grass, and certainly the rank grass of the beaver meadows was untouched.

Paying off the two Indians, who loaded their bark canoe with gull squabs from a rock off the harbor, we parted company, they to paddle along shore to Pic; and Stephen and myself to coast eastwards in the Peterborough to the mouth of the Pucaswa, where we expected to meet the fishing boat. Seeing no signs of the boat at that point, we pushed on towards Pilot harbor, meeting our friends half way and finding that all had gone well with them. As our supplies for the last two or three days had got down to flour and the trout to be caught in every stream, we were not sorry to secure better rations.

Rolling Hills
and Spruce
Forests.

Ascent of
Tip Top
Mountain.

Caribou.

Reunion of
the Explor-
ation
Parties.

It was too late in the day to sail over to Quebec harbor on Michipicoton island, our destination, so we chose a Sunday's camp in a little bay east of Puciswa.

The rocks at this camp consist of schist conglomerate, forming a fringe along shore for $1\frac{1}{2}$ miles and including several small islands; and felsite or porphyrite on the hills inland, where the country to the north is very rugged. A small patch of Keweenawan conglomerate shows on a large island near by, one of many instances on this shore where a remnant of these easily attacked rocks has been preserved in a fissure of the older, harder rocks.

During our trips across country, Mr. Coulthard in the Caribou had visited Caribou island, far south of Michipicoton island. He found the rock to be brown St. Mary's sandstone, like all the other islands in the southeastern part of lake Superior. The island is low and covered with scrubby trees, mostly spruce. A light-house and fishing station, occupied only in the summer, are on a smaller island just to the south of Caribou island, one of the loneliest inhabited spots on lake Superior.

Michipicoton Island.

With the exception of St. Ignace, which protects Nipigon bay, Michipicoton island is the largest of the innumerable Canadian islands in lake Superior. It lies about ten miles due south of Pilot harbor, but its only inhabited port is Quebec harbor on the south side; and in spite of its indented shores as shown on the chart, it seems not to possess many well sheltered harbors. The island has long been known to be copper-bearing, and its rocks and mines are briefly described in the *Geology of Canada*²³; where the whole island is shown to consist of Upper Copper-bearing rocks, i.e. Keweenawan, consisting mainly of various kinds of trap and sandstone or conglomerate, the whole footing up in thickness to not less than 12,000 feet.

Philipps and Quebec Mines.

We landed on the northwest side of the island, visiting the two mines once operated

there, the Philipps and the Quebec mines. The shaft of the Philipps mine was found to be nearly full of water and no ore was to be seen on the dumps, only weathered amygdaloids. The Quebec mine two or three miles to the west had just been pumped out by Mr. Cozens of Sault Ste. Marie, who had control of it, that it might be examined. It has since been reported that the mine is sold.²⁴ We were however too late to meet the party which had unwatered and examined the mine. There are 15 or more well built houses for one purpose or another besides three shaft-houses and a large mill, the latter provided with a concentrating plant. There are two curious caves to the west of the camp, one over the other, the lower one being used as a powder house. This cave is 26 paces long, 12 wide and 15 feet high near the mouth, and a natural arch or bridge spans the space before the entrance. Its floor is about 15 feet above the lake, which lies only a few yards away; and the cave seems due to wave action at a time when the water stood higher than now. The second cave, 40 or 50 feet above the lake, is evidently an old sea cave also. The rock is dark diabase.

A fine set of terraces may be seen from the lake as one approaches Michipicoton island at the Quebec mine, and a good road leads across the island to the south shore passing over them. We measur-

²⁴Two specimens of ore from Michipicoton island, sent by Mr. Cozens to the Director of the Bureau of Mines and forwarded to me for examination, are good examples of the copper-bearing conglomerates of the Keweenawan of lake Superior. They are rather dark purplish gray rocks, consisting of pebbles and smaller fragments of felsite, quartzless porphyry and less often quartz porphyry, cemented by a small amount of a soft white or greenish substance, partly calcite and partly a zeolite, so far as can be determined without blow-pipe tests. Chalcedony approaching agate in structure occurs in one specimen. The most interesting mineral however is the native copper, which is untarnished and forms irregular plates and masses between the small pebbles of the conglomerate, and hence occupies the place of part of the cement of the rock. It is plentiful enough to hold together shattered fragments of the stone, and in these specimens is evidently present in quantities sufficient to make the rock a most valuable copper ore. In general appearance the specimens are of precisely the type of the copper conglomerate so extensively mined in northern Michigan, and as they occur in rocks of the same formation there is reason to hope that mining operations will disclose deposits of much importance.

²³1863, p. 81 and also pp. 703-4. See also Macfarlane, *ibid*, 1863-66, p. 137, etc.

ed four prominent ones at levels of 61, 191, 233 and 288 feet respectively; many less marked water levels occur also. On the 233-foot terrace there is a nice farmhouse and barn, now deserted. The soil looks rather poor in most parts. The road passes a lake of considerable size at the level of the farm, and another one at about the level of the next lower terrace. The region around the Quebec mine is very pretty, with a hill 900 feet high as a background and the terraces partly wooded but mainly cleared, rising up from the water. The road running south from the Quebec mine is rather grown up with bushes, part of the way being now little used. It comes out at the south shore where a black eruptive glass or pitchstone occurs, and also amygdaloids with some fairly good agates. Here the road turns east along the shore to Quebec harbor, a land-locked bay with a lighthouse at its mouth. There are several houses on the shore of the bay, but only two or three families of fishermen and the light keeper live there at present. There is a large clearing with a good crop of timothy hay just being cut on August 2.

Quebec
Harbor.

Volcanic Rocks.

Cruising round the island toward the east, much red quartz and also quartzless porphyry are seen, whole bays having their pebble beaches and shore cliffs of this richly colored rock. On other bays the rock is a black diabase, amygdaloid or pitchstone, forming beaches as well as rock walls, and giving a very somber effect. The rocks obtained will be described in another part of this report. On many of the beaches agate pebbles are found, and veins of quartz, chalcedony and agate occur in the diabase.

The island is a very interesting one, not only on account of the varied volcanic rocks which chiefly compose it, but also because of its rugged and picturesque shore line and mountainous interior, dotted with many charming little lakes. At present, however, its only regular communication with the mainland is by means of an American fishing steamer.

Michipicoton Mining District.

As Prof. Willmott reported on this district last year and is familiar with its general

features, it has been thought best that he should prepare the following report of our work in the region during the past summer:

Schist Conglomerate and Granite.

"From the mouth of the Doré the schist conglomerate was traced for four miles to the east, to a point one mile east of Gros Cap wharf and 200 yards inland.

The strike is very uniform, never varying more than 10° from 80°. The continuation of this course for four and a half miles farther would cross the Magpie river three miles from its mouth, and here a conglomerate was noticed last year. Two and a half miles to the northeast a similar conglomerate with a strike of 75° is exposed at the northwest angle of Wawa lake. That these three occurrences are part of one band is very probable, although the one strike recorded for the rock on the Magpie (148°) is far from the general direction."

"At the second portage up the Magpie the boss of eruptive granite was again examined. It is very coarse-grained and consists of round blebs of quartz in a red felspar, with almost no mica or hornblende. In the river gorge, at the foot of the rapids, is a section showing 90 feet of green schists curving in a gentle anticline over a boss of the granite 30 feet in height. At the head of the rapid both sides of the stream are granite and continue so for half a mile upwards, when a banded schist is met. The schist is in part felsite, carries much pyrite, and seems in places to contain pebbles obliterated by being rolled out like those around Heron bay. The immediate contact with the granite was not found. A few hundred yards up stream the strike increases to 170°. About a mile above is the conglomerate noticed last year and striking 148°.

"One-quarter of a mile below the portage a small scrap of conglomerate was found striking 180° and containing pebbles of felsite and quartz porphyry. Apparently this boss of granite has come up through the schist conglomerate, dislocating a piece to the south and disturbing the strike of both.

"All the islands south of the Doré consist of conglomerate except the most south.

eastern one, where a small scrap of chlorite schist was found on the south side. On an island just to the north-east of this a dike of greenstone 20 feet wide has pierced the conglomerate, following the strike.

“On the mainland adjoining the conglomerate to the south is a chlorite schist. This is followed by a narrow band of quartz porphyry and this by an agglomerate rock. The same rock occurs just east of the wharf, where it is a compact green rock enclosing lenticular pieces which only appear distinct on the weathered surface.

Hematite Iron.

“South of the agglomerate on the west shore of Gros Cap is a band of chlorite schist which includes several narrow bands of quartzite. The extreme south-west of the cape is a diabase schist.

Associated with the quartzites are considerable bodies of hematite and a number of test pits have been sunk on both sides of the cape. The most extensive workings were on the southeast coast, where the old dump may still be seen, although the trench is overgrown and the shaft filled with water. A description of the rocks was given by Macfarlane in his report of 1866 when operations were going on, and little can be added now when everything is overgrown with moss or covered by debris.”

“The ore as found on the dump consists of compact hematite associated in layers with quartzite. A specimen analysed by Sterry Hunt²⁵ yielded :

Ferric oxide	86.80
Insoluble residue	12.75
Phosphorus	trace
Sulphur	.092
	99.64 ²

Macfarlane gives the thickness of the ore bands as one-half to four or five inches, and the maximum thickness of the deposit at 60 feet. This was as he saw the early workings on the surface. Captain William Grierson, who sank a shaft to the depth of 64 feet (on the dip of the bed) in the winter of 1867 informed me that at the bottom the quartzite disappeared and that there was solid ore for the full width of the shaft, seven feet. No

crosscut was made. Water came in the shaft and had to be baled out. All hoisting was done by hand. J. W. Johnston of Detroit was owner.

“The ore on the dump is all interbedded with quartzite, very little being solid hematite. The part of the bed which seems to have been worth working was about 25 feet wide. Two open cuts were made on the bed, each about 100 feet long, one near the level of the lake, the other a continuation of the first but higher up the hill. From the northern end of the upper cut the shaft was sunk. The vein bears about 135° and dips 45° to the southwest. On the continuation of this strike on the south side of Michipicoton bay I have noticed small seams of hematite in the schists, but evidently resulting from iron pyrites found accompanying them.

“Just northeast of the iron deposit is an irregular bed of sandstone a few inches wide enclosed in the chlorite schist. The sandstone is in places largely magnetite, in other spots a nearly pure sandstone and very friable. It has been so crushed and contorted that in places the chlorite schist seems to contain pebbles of sandstone unconnected with their neighbors. This crushed sandstone may be compared with that described by Dr. Coleman as occurring one mile west of Fort Frances. Some boulders from the conglomerate at the mouth of the Doré are exactly like this sandstone, and may have been derived from it. It is worthy of note that the sandstone is on the lake Superior side of the conglomerate, and is now dipping from it. The same chlorite schist encloses within a few hundred feet a bed of friable sandstone with magnetite and a bed of quartzite with hematite.

Gold Mines at Wawa Lake.

“One day was spent by Dr. Coleman and myself in a trip from Michipicoton Post to Wawa lake and some gold properties to the south of it. At the Jubilee mine on locations 38 and 75 we found Mr. A. Douglas in charge for the Great Northern Mining Exploration and Development Company. The vein, which is a bedded one, has been traced for a mile with a strike of

²⁵Rep. Geol. Sur. 1866-9.

about 20°. The shaft was down 60 feet following the dip of the vein, that is about 45° east. According to Mr. Douglas the vein varies in width from 7½ to 10 feet. At the surface considerable free gold was found. Towards the bottom of the shaft some of the adjoining gneissoid rock becomes mixed with the quartz.

"The Diamond Jubilee mine is on location 92, a short distance southeast. Messrs. Tisdale and Boyd are owners.

Diamond
Jubilee
Mine.

Considerable work has been done in stripping the veins, of which several have been found carrying free gold. Their surface workings were about at the level of a small lake, and to keep their prospecting pits dry it was found necessary to lower the level of the lake by blasting out the rocky barrier at its outlet. The veins are bedded in felsite or sericite schist, striking 25° and dipping 70° east. Eruptive gneiss occurs to the north and to the southeast of the workings. At the deepest pit, 12 or 14 feet, near the lake, the quartz looks quartzitic, is bluish white in color and carries pyrite, pyrrhotite, chalcopyrite, a gray carbonate and free gold. An assay of a sample of this ore, taken by ourselves gave 5.03 oz. per ton. To the south a vein of quartz occurs between granite on the west and chlorite schist on the east.

"On the Ward property just south of this considerable prospecting has been done.

Six openings have been made, the deepest being 15 feet, and some stripping has been done. The contact of the gray gneiss and green schist is well-shown on the long lake on which the camp is situated.

The Ward
and Mackie
Properties.

"At the Mackie property on Wawa lake nothing has been done since the last report beyond the erection of two log houses. At Wawa city several frame buildings had been erected and others were being built.

Defining Rock Areas.

"On the map published last year the contact of the Laurentian and Huronian south of Wawa lake was settled by an excursion up the Fine Sand river from the Michipicoton. After crossing a small band of Huronian

The Contact
of Lauren-
tian and
Huronian
Formations.

about a quarter of a mile in width, what appeared to be the main mass was met about one-quarter of a mile south of lake Leroy. The red granite at the second portage up the Magpie and the granite porphyries to the south of Wawa lake were thought to be later eruptives. It is now evident that the rocks southeast of Wawa are mainly granites or gneisses enclosing small scraps only of Huronian. It is moreover probable that the rock on the Magpie though differing in structure and composition belongs with these granites. This being so, the boundary of the two formations runs from the long portage of the Michipicoton to the second portage up the Magpie, and thence northeast along the axis of Wawa lake to a point west of Hawk lake. Included in this area, now transferred from the Huronian to the Laurentian, are a number of Huronian masses which were doubtless torn off from the main mass by the eruptive granite.

"One mile and a half south of the high falls of the Michipicoton a schist conglomerate

was found a year ago. Apparently this is a continuation of the band met with on the Magpie nearly eight miles to the northwest. From here the band has been traced west for eight miles to the Doré, and from there a succession of scraps along the shore probably indicates its continuance for 11 miles to near the mouth of Dog river. Two miles up the latter stream it is found at Denison falls, a total length of 29 miles. For two-thirds of the distance an eruptive granite is in contact with the conglomerate."

General Features of the North Shore.

Looked at as a whole the north shore of lake Superior from the Sault Ste. Marie to

Impressions
of the
Superior
North Shore.
Peninsula impresses one by the magnificence of its scenery, often wild, rugged and mountainous; by the number and variety of its harbors, which are however generally small; by the multitude and picturesqueness of its islands; by the widespread ancient beaches, and by the general barrenness and desolation of the land.

Leaving out perhaps 100 Indians, our captain estimated that on the whole shore line

of not less than 320 miles there are only about 350 people, of whom a large number are not

permanent residents, but go to the "Soo" or elsewhere in the winter. If we commence the count at

Point Mamainse, 45 miles from the Sault, we have only about 150 people scattered along a shore of 275 miles, and more than half of them are away in winter. Finally in the 70 miles from Ganley's harbor north of the eastern end of Michipicoton island to the mouth of Pic river there was not an inhabitant, white or red, when we passed up last summer. The men frequenting the shore at present are mainly fishermen in the employ of one or two large companies, their catch consisting chiefly of delicious whitefish and of salmon trout. The fish are taken partly in pound nets near the mouths of the rivers, and partly in gill nets set in fairly deep water in the open lake. Sayers, our captain, an experienced fisherman, says that nets are seldom set in water deeper than 100 fathoms (600 feet) because at a greater depth the cedar floats become water-soaked by the pressure and no longer keep the net upright. The fish caught at great depths are mainly very fat and large salmon trout. While the usual depth is between 10 and 100 fathoms, they sometimes, off Caribou island for instance, get one end of their net down even to 160 fathoms (960 feet). This is not far from the greatest recorded depth of soundings in lake Superior, 1,008 feet. Most of the rivers and inland lakes contain splendid trout, some of them true brook trout.

Northwest of Mamainse there is very little land suitable for cultivation so far as our

observations go, though small areas may be found inland; and the only promising resources known are

found in the water powers, the spruce forests and the copper and gold mines. The shore climate is generally cool, even in the warmest months demanding heavy clothing for comfort; owing to the vast body of cold water in the lake. Inland a few miles however the weather may be very hot even though hundreds of feet higher up. This difference is well shown in the ripening of wild fruit such as strawberries, blueberries and bilberries

(or saskatoons) which we found very plentiful and quite ripe on July 23, 700 feet above the lake and 20 miles north of it; but still green on the hills at the mouth of the Pucaswa several days later. The coolness of the climate does not prevent the black flies, sandflies and mosquitoes from swarming in early and middle summer all along the shore.

To one accustomed only to the wave action of comparatively small lakes, like Ontario, the power of the waves on exposed shores of lake Superior is very surprising. Boulders a foot in diameter are rolled by the waves up and down beaches which rise to a height of 20 feet above the normal water level, and are as beautifully rounded as the pebbles on lake Ontario beaches. The isolated islets and rugged stacks along the shores and the wave-cut caverns testify to the same thing.

The formation of well-rounded pebbles is very quickly performed in the case of soft rocks. Calcite fragments used in the crib-work protecting Silver Islet were found perfectly rounded ten years after the mine ceased working.

The elevated beaches so common on the north shore up to 300 or 400 feet above the present lake have their pebbles and boulders as well shaped as those on the beach of today. The question of these old lake levels will be discussed however in another section of the report.

On the whole the shores of lake Superior much resemble stormy sea coasts, the main difference being the absence of appreciable tides. Tides of a few inches magnitude do exist however, as well as irregular risings and fallings of the water (seiches) due to varying barometric pressure on different parts of the lake.

Near Michipicoton Post.

A short stay was made at Michipicoton Post on our return from the island of the same name; and the Collingwood Development operations skiff and its crew, after serving us well during the summer, returned to Sault Ste. Marie; while we made a brief examination of the Wawa gold region. As the geology of this region was partly worked out by Prof. Willmott last year and published in

Resources
of the
Mainland.

The power
of Wave
Action

his report on the Michipicoton Mining Division,²⁶ and has been further described by him in foregoing pages it is unnecessary to make further reference to it here. We found a considerable amount of building going on both near the Post on the river and at the new town on Wawa lake. A good deal of prospecting work also was being carried out on a number of properties; but none of them had advanced far enough to be called mines. Several of them looked promising, but all require further development before their real value can be determined. British Columbia and the Klondike had attracted the attention of many away from the less dazzling prospects of a quartz mining region, but those who remained seemed hopeful and satisfied as to the prospects of the country around Wawa.

After visiting the mines we took the steamer Telegram at Little Gros Cap, to which a steam ferry now runs from the mouth of Michipicoton river, and returned to Sault Ste. Marie.

Thessalon District.

We now went by rail to Thessalon in order to complete the examination of the mines to the north of that town, and on the way spent a few hours examining the Huronian rocks along the railway between Bruce Mines and the harbor of Thessalon. A mile east of Bruce Mines we found a band of limestone, striking east and west and with a vertical dip. Half a mile beyond there was quartzite with pebbles of black chert, lying apparently horizontal; the latter rock, perhaps Upper Huronian, resting unconformably on the upturned Lower Huronian. At Thessalon there are, as noted by Logan, amygdaloidal diabases belonging to the Huronian.

Cheney Copper Mine.

From Thessalon we drove northeast about 20 miles to the Cheney copper mine on the Mississaga river. The road leads first over level plains of clay or silt, old lake deposits with good farming land, now pretty well cleared and cultivated.

Then come hills with some rock exposed, especially Huronian quartzites and red syenite, followed by level terraces mainly of sand and gravel with rather light soil but fairly well settled. Finally a hill of slate conglomerate rising 490 feet above lake Huron must be ascended and then descended to reach the mine, which lies near a picturesque waterfall on the shore of the river. The road on the whole is very good, the mining company having spent \$1,000 in putting the latter part of it in good shape.

It was known many years ago that copper ores existed up the Mississaga river, various localities where small outcrops of Development occur being mentioned by Murray Work. in the Geological Survey report for 1858²⁷; and the present location was taken up in 1864 by Mr. Borron, for a Mr. Ray of Indiana. It was then turned over to a Mr. Drake, who formed a company or syndicate to work the location. The members of the syndicate are mostly of New York State, and the property is held in the name of Mr. J. A. Powers of Lansingburg near Troy, N. Y., Mr. F. A. Cheney being managing director. The latter gentleman deserves our warmest thanks for the hospitality afforded us and for the information given as to the mine.

The earlier company had sunk an 84-foot shaft, but the present company, which took hold of the work more than a year ago, has straightened the shaft and sunk it to 168 feet, besides drifting at the first level 100 feet to the northwest and 20 feet to the southeast.

The vein was three feet wide on the surface, runs northwest and southeast through a country rock of slate conglomerate, and is said to have been traced $2\frac{1}{4}$ miles. It widens as it goes down and changes its dip from 5° to the northeast on the surface to about 20° . The foot wall is very distinct all the way down, but in the lower part the vein matter is much mixed with rock.

For the first 100 feet there was good ore, chiefly chalcocite (glance), at one point at that level forming a solid ore body as much as 40 inches wide. With the chalcocite a little bornite and copper pyrites are associ-

²⁶Bur. Mines, 1897, pp. 184-206.

²⁷Rep. Progress, 1858, p. 225.

ted. It is found that reddish or rusty quartz carries no ore, but that white quartz is productive. Unfortunately very little chalcocite has been found below the 100-foot level.

Between 65 and 73 feet in depth 8,037 lb. of glance was obtained by hand picking; and in all a car load of good ore, amounting to 20 tons and 400 lb., has been shipped east to the Orford company. The select ore runs from 22 to 40 per cent. of copper, the poorer ore not being treated at present. It was intended last fall to stope out and ship the rest of the rich ore disclosed above the 100-foot level. It costs \$4.50 per ton to team the ore to the station, and \$6 as freight to the east. If it should seem wise to put up a mill for the treatment of the ore there are fine falls on the river close by. The nearest, called the Baboon Falls, from the appearance of a baboon's head in the rocks, is close at hand and has a drop of 20 feet. Not far off there is an upper fall of 34 feet.

At the time of our visit 16 or 17 men were employed under Wm. Blewett as mining captain; and the buildings and equipment seemed adequate for the work on hand.

The Mississaga Placers.

Some miles down the river from the Cheney copper mine there was an attempt at placer mining a year or two ago. On our way back to Thessalon, by round-
Exploiting a Lake Terrace for Gold. about and bad roads, we visited the placer on Mr. James Ralph's farm, the south half of lot 3, con. 1, in Wells township. At this point a sand and gravel terrace is cut by the Mississaga river, showing a face of about 40 feet. Sluices had been arranged by Mr. Wilson of Toronto to wash the sands, a water supply being obtained from the hill-side some hundreds of yards from the river. Near the foot of the cutting coarse brown sands cemented by brown oxide of iron were supposed to carry the largest quantity of gold. Samples of the yellowish sand above and of the brown cemented sand were taken with care, the amount making a number of pounds in all. Pan tests and also assays of both kinds of sand, made in the laboratories of the School of Practical Science, Toronto, yielded traces of gold, but only a few cents per ton. It seems very doubtful therefore if

the placer ground will prove of value. If it should prove workable, the quantity of sand in this old beach deposit or terrace is very great, and might give rise to very important bench diggings.

It should be understood however that the sand and gravel deposits along all the rivers of the north shore of lakes Huron and Superior are lake deposits, many of them deltas, formed when the water stood at a higher level than now, and not ordinary river deposits. Most placer mines are on the gravels found in river valleys, ancient or modern. A few rather unimportant placers are sea-shore deposits; but few or none are known in true lake beaches.

So far as our information goes bed rock has never been reached on the Mississaga river, but whether this would prove any richer in gold than any other layer in an old lake deposit is doubtful.

Goulais Bay District.

On August 11 Prof. Willmott and I set out for Goulais bay to complete our study of the Huronian rocks, while Messrs. George and Coulthard started for home, taking the Sudbury mining region on the way. Goulais bay may be reached by water, but there is no connection by road with the settlement inland along the river valley, so we decided to drive from the Sault Ste. Marie.

The road leads west into the township of Korah, and then turns north till it reaches the river. The first five or six miles are excellent, largely over old lake terraces, the higher ones of gravel. On the northward part of the 20 miles journey, however, the country becomes mountainous and the road very stony and bad, the highest point as determined by aneroid being 800 feet above the Sault. The road climbs terrace after terrace, at first of clay, forming good farming land, now mostly occupied; then of sand and gravel; and at last crosses solid rock, more or less covered with boulder clay. Descending from the highest point one reverses the succession of terraces until the flat plain of Goulais river is reached. Here the soil seems fair though rather sandy, and a considerable number of farms are occupied.

Further study of the Huronian Rocks.

A Mountain Road to Goulais River.

The rocks observed along the way are mostly Laurentian gneiss. The most comfortable stopping place in the settlement is at the house of Mr. McAuley, the postmaster, which is several miles north of the bridge crossing the crooked river, just at the southeast corner of Haviland township, between Goulais and Batchawana bays. A somewhat steep and stony road leads north and then northwest from this point to the settlement on the western side of Batchawana bay.

Formations on Goulais River.

The ground rises as terraces in McAuley's neighbourhood, affording level stretches of good but sometimes stony clay soil, now largely divided into farms and partly under cultivation. The rock observed here and to the north is Huronian, partly felsite in beds alternating with slate, partly Logan's slate conglomerate with eruptive masses of syenite or gneiss breaking through it. Some of the slate is very cleavable and might be of value for roofing.

The highest point in the settlement, called rather absurdly the "King of all the Mountains," was ascended and found by ^{King of the Mountains.} aneroid to rise 1,320 feet above lake Superior, or 1920 above the sea. It was used as a triangulation station by the U. S. Hydrographic Survey, and remains of their tripod are still to be seen on its highest point. The rock of which it is composed is quartzite, the hardest and most resistant of the region. On the side fronting the settlement it is so steep as to be almost unscaleable, but a blazed path winding round behind the mountain top gives an easy ascent.

From the summit the view is very fine, more variety of surface being in sight than from Tip Top mountain, though the latter is about 200 feet higher. Some miles to the northeast one can see a mountain which looks distinctly higher than the King of all the Mountains, and it is possible that this may even surpass Tip Top in height. All round the peak there are forest covered hills with here and there bare slopes of rock, while in the valley the grass and grain fields about 1,000 feet below look like the squares of a checkerboard. The deep bays indenting this part of the shore of lake Superior show as splendid expanses of blue water.

It was surprising to find so much cleared land in this isolated settlement, though much woodland still remains untouched. ^{The Settlement.} Grain of various kinds was ripening on August 12, and the crops looked well, though there is no object in raising more grain than can be consumed on the spot; since the terrible mountain road to the Sault prohibits teaming it out at a profit, and the lumbermen, on whom the settlement so largely depended in former days for its market, have practically finished their work in the region. The settlers are hoping to have a new Government road cut to the Sault, not only much shorter because more direct, but also avoiding the mountain now to be crossed. This would help them greatly in regard to markets, and would probably open up some fair land not yet settled upon. A road of about six or eight miles, cut to the landing place of the fishing station on the point west of Goulais bay, would also give them an outlet during the summer.

The forest of the region is mainly hardwood, such as maple and black birch on the drier and richer soils; and young apple trees in fruit at McAuley's looked very thrifty, showing that the climate is not bad. At present however the settlement depends mainly on its stock as a source of income. If the copper mines of Mamainse and Michipicoton island are developed with success there should be an excellent market for the people of the settlement almost at their very doors.

Pleistocene Geology.

The wonderful series of terraces and old lake beaches displayed in the region worked over last summer has attracted much attention from the days of Agassiz's journey to lake Superior to the present. The most extensive account of these old beaches is that of Dr. A. C. Lawson, published in the Report of the Geological Survey of Minnesota in 1893,²⁸ where he gives in detail the elevation of very many abandoned strands as determined by careful levelling. The precision of his determinations, usually given to fractions of a foot, is perhaps a little deceptive, since

²⁸Geol. Sur. Minn., 20th Ann. Rep., p. 182, etc.

beaches and strand lines are quite variable things. The beach forming on the present shore of lake Superior varies as much as 15 or 20 feet in height, bays facing prevalent winds showing ridges of gravel and boulders, well rounded by wave action and free from any growth of lichen up to at least 20 feet. Nevertheless Lawson's work is of very great value.

The same strand lines with a few others observed by himself have been discussed by F. B. Taylor²⁹ in "Notes on the Abandoned Beaches of the North Coast of Lake Superior." He concludes that the beaches lying about 400 feet above lake Superior probably belong to lake Algonquin, and a lower series of beaches to Greater Lake Nipissing.

Lawson's table of elevations shows that the beach levels are very numerous, 32 or 33 in all. Our work during the past summer covered 21 points where good raised beaches were found, and wherever possible they were measured, mainly by aneroid, but in some cases with a hand level. The results have not the accuracy of Lawson's, but as two aneroids were generally read together and checked by lake level readings before and after the heights were determined, their results should be fairly correct. Where a number of readings were made the results given represent the averages.

With us as with Lawson beaches at relatively low levels were most often met, and were found to be so numerous as to present an almost continuous series. In many cases, especially where wave ridges were measured, it was found that there was a succession of ridges each a few feet lower than the previous one, often with 50 or more feet between the highest and lowest ridge. Such a succession of ridges must indicate a fairly gradual ascent of the land.

In the following sketch of the subject the localities will be taken up from southeast to northwest, the levels of the beaches being referred to the nearest great lake, Huron to the east and southeast of the Sault Ste. Marie, Superior to the northwest of that

dividing point of the waters. As lake Superior is 602 feet above the sea and lake Huron 581, there is a difference of 21 feet between the two lakes, about 18 feet of the total fall occurring at the St. Mary's rapids.

Two sets of measurements, those at the southern end of the Georgian bay, stand by themselves, being 170 miles southeast of Thessalon, where the main series of measurements begins. From Thessalon onward the gaps between the series are usually not great.

Beaches at the Southern End of Georgian Bay.

A number of old water levels were measured both at Owen Sound and Collingwood, but those at the latter point are all much higher than at the former.

Water Levels at Owen Sound and Collingwood. Three well defined terraces were

found at Owen Sound at heights of 18, 49 and 124 feet. They may be seen on both sides of the valley, and show no beach formation, being probably terraces cut by the river in a delta deposit. At 156 feet above lake Huron there is a ridge of coarse but well rounded gravel, probably a beach ridge.

The beaches near Collingwood are found at the foot or on the flanks of the Blue mountains, some miles inland. Between the bay and the foot of the escarpment there are three or four ridges, perhaps a beach formation, but possibly morainic. The presence of many scattered boulders in the fields is probably to be accounted for by lake action however, and it may be that closer scrutiny will disclose well defined beaches corresponding to those of Owen Sound. At the Kirkville mill stream one sees 20 feet of coarse stratified sand interbedded with fine silt, probably lacustrine deposit. An upper layer of the silt appears to have been crumpled by the grounding of ice floes.

The first undoubted beach is at the foot of the steep ascent of the mountain, 207 feet above the bay. There are less certain beaches at 288 and 468 feet respectively. The highest beach is 940 feet above lake Huron and is one of the best marked. A terrace large enough to contain several fields lies immediately below the sharp limestone cliff of the top of the mountain with a talus of great blocks tumbling down upon it. This cut terrace is well marked on the mountain flank

²⁹Am. Geol. vol. xx., Aug. 1897, p. 111, etc.

three or four miles to the south. Where we visited it the mountain top rises 113 feet higher than the terrace, and no doubt formed a large island in the vast body of water which cut the terrace. Spencer in his account of "High Level Shores in the Region of the Great Lakes" marks several isolated beach levels in the mountainous region south of Collingwood, three of them about 1,400 feet above sea level and one at 1,690 feet. The beach measured by us seems about intermediate, since our readings make it 1,521 feet above the sea. Our reading at the foot of the mountain, 788 feet above sea level, corresponds fairly with one of his beach lines, where a point 773 feet above the sea is indicated, a variation not too great in the shore deposits of a great lake³⁰; but fits better with Taylor's determination³¹ of the Algonquin beach at Barrie, about 780 feet above sea level. The higher beaches on the Blue mountains cannot at present be identified with any ancient lake or arm of the sea that has been described, unless they correspond to stages of lake Warren. The one 468 feet above lake Huron, or 1,049 feet above the sea, may fit into Spencer's highest or Ridgeway beach.

The comparatively low beaches at Owen Sound probably mark phases of Taylor's Nipissing water level.

Old Beaches near St. Mary's River.

The next set of beaches examined runs from Thessalon and the country in its rear to Goulais river north of Sault Ste. Marie. Taking them up from east to west we shall commence with those near Thessalon. Going northward to the valley of Mississaga river four distinct water levels are encountered. The alluvial plain of clay north of the town stands 26 feet above lake Huron; and another level terrace of clay forming good farming land is found west of Little Rapids at 61 feet. The higher terraces are of sand and gravel, one in the Mississaga valley forming a level sandy plain covered with farms, at 176 feet, and the highest of all 14 miles northeast of Thessalon, a terrace consisting of stratified sand and gravel rising 404 feet above lake Huron.

³⁰Am. Jour. Sc., vol. XII., Mar., 1891, p. 202.

³¹Am. Geol., vol. XIV., Nov., 1894, p. 274.

North of Bruce Mines terraces are very numerous. One at Rydalbank forms a wide-spread clay with good farm land at 132 feet above lake Huron; the next is above Otter-tail lake at 148 feet. The third in height consists of stratified sand rising to 191 feet; and the fourth of sand and gravel at 295 feet. There is a well marked gravel terrace at 375 feet; and a series of wave beaches forming a gravel ridge with well rounded pebbles and boulders culminates at 430 feet. There is another well marked terrace of the same materials, perhaps only the highest stage of the last one, at 453 feet above the lake 11 miles north of Bruce mines. The lowest terrace of all occurs below the Ophir mine about 20 miles north of Bruce Mines at 98 feet above the lake. It is well defined along the valley of a creek.

A single well marked terrace was examined on Sugar island in United States territory

not far from Garden river, and was found to rise 142 feet above St. Mary's River.

Mary's river, just before it enters lake George. Near Garden river to the northeast of the mission there are numerous terraces, but the weather on one of our days of work was unfortunate, the barometer varying rapidly. The highest terrace observed on that day probably reaches 435 feet. On another day atmospheric conditions were better and a series of lower terraces was examined, beginning with the sandy plain 22 feet above the river, on which the settlement stands. The section shown along the lower reaches of the river consists of sandy silt with fragments of wood and bark for eight feet, coarse brown sand forming the upper part of the bank. Other sandy and gravelly terraces rise 45 and 77 feet above the river, the latter one being an old beach. A group of rather ill defined terraces runs from 149 to 158 and probably 171 feet above the river; and there is a poorly marked terrace at 213 feet above lake Huron.

Near Sault Ste. Marie.

The Sault Ste. Marie is a most important nodal point in the great lakes, and its raised beaches have an unusual interest appreciated by several observers.

Lawson has levelled a number of terraces, two within the town, the others to

Thessalon
and Mississ-
aga Terraces.

A long series
of Raised
Beaches.







Shaft, Incline and Engine House at Mamainse.

Willmott.



Mamainse Copper Mill.

Willmott.



Cave in Amygdaloid at Roussain's, Lake Superior

Willmott



Cave in Conglomerate, Granite overlying, north of Pointe aux Mines, Lake Superior

Willmott

the north of it, rising at the highest point to 414 feet above lake Superior.³² Our excursions in various directions north and northeast of the town gave opportunities for examining the terraces within 20 miles of the "Soo," but our results do not agree very well with Lawson's. We find a number more strands than he does, and some at distinctly higher levels, but only a few of our measurements fit with any precision the figures given by him. It must be remembered of course that the results of aneroid readings taken hours apart are not to be depended on within 10 feet, unless repeated a number of times with precautions as to changes of barometric pressure.

Besides the two lower terraces in town there is a wide stretch of level clay land to the north, at about 90 feet above lake Superior or 110 feet above lake Huron, evidently an old lake deposit, apparently not referred to by Lawson. Four miles north of this in Tarentorus township he measured a great series of terraces, one at 311, another at 365 and several more between 400 and 414 feet, the latter shingle beaches. Our work northeast of the Soo, toward Ottertail lake and the Ophir mine, showed 18 or more strands, including a series of shingle beaches from 441 to 447 feet, perhaps identical with Lawson's upper series, though the difference of elevation is too great to be easily accounted for.

An excursion to Batchawana bay disclosed a similar set of beaches, first in climbing the mountain 800 feet high over which the road passes; then in descending the same towards Goulais river; and finally in ascending the height of land between Goulais river and Batchawana bay. Terraces were found at 39 and 57 feet, from 102 to 113 feet, at 136 feet, at about 190 feet, at 280 feet, at 304, between 327 and 379 feet, between 432 and 475 feet, and finally at 502 and 596 feet. The beaches between 432 and 475 feet were partly of rounded gravel, partly sandy terraces. They appear to stand about 30 feet higher near Batchawana bay than 15 miles south and nearer the Sault, though too much stress should not be laid on this where the deter-

minations were by aneroid several hours away from the level of comparison. If the difference is real it indicates that this set of beaches has a quite rapid differential elevation towards the north.

Beaches on the Northeast Shore of Lake Superior.

About 10 miles west of the Sault the fine promontory of Gros Cap rises where lake Superior opens out. The mountainous mass of rocks forming the cape protects two well marked sand terraces towards the east, at levels of 56 feet and 224 feet above the lake (determined by hand level). The higher one corresponds exactly to a beach measured by Lawson north of the Sault, but the lower one is a few feet higher than the main beach leveled by him in the town.

At Batchawana bay, along the river of the same name, two well marked terraces were measured at 25 and 104 feet respectively, the latter corresponding closely in height to a terrace south of Goulais river. At Mamainse 10 or 12 miles to the east Lawson indicates three beaches at levels above both of those just mentioned, his lowest being at 122 and his highest at 191; but we found two lower beaches with well rounded gravel at about 35 and 58 feet respectively, as well as a gravel beach with shore cliff 40 feet high at 184 feet, perhaps Lawson's highest. At Montreal river Lawson gives five beaches, the highest at 211.3, corresponding fairly with the highest measured by us (214). The lower ones on his list were not observed by us, perhaps because we kept to one side of the river only, but a still lower beach at 33 feet was found. At Sand river, a few miles north of Montreal river, Lawson mentions beaches at 75 and 118 feet, the latter not being well marked. Our observations probably extended farther inland, as we found well marked beaches at 72 feet, 144 feet and 234 feet, with well rounded pebbles at the lowest and highest beaches. The one at 234 feet has a distinct cut bank in the rear, and ascending this one finds a flat wooded plain, probably another terrace, 257 feet above the lake. None of these terraces except the lowest one seems to correspond to levels found at Montreal river. At Gargantua, ten miles to the northwest, a well

³²Geol. Nat. Hist. Sur. Minn., 20th Ann. Rep. p. 281.

defined beach of rounded boulders was found at 72 feet; but no higher ones, although a neighboring hill rising 431 feet above lake Superior was ascended.

Between Michipicoton Post and Wawa lake, at the foot of the deep Michipicoton bay, a fine series of beaches is crossed by the portage road connecting the two points. We measured eight

Terraces at Michipicoton.

fairly distinct ones and noted numerous minor beach lines between. The same series was measured last year by Prof. Willmott with accordant results for the lower terraces, but some differences for the higher ones.³³ We found terraces on sand plains at 38, 75, 83 and 99 feet within a mile of the landing on Michipicoton river, the two upper ones being practically the same as Prof. Willmott's (84 and 100 feet). A fifth level at 136 may represent his third at 145; and a sixth at 240 his fourth plain at 224. Wawa lake stands at the level of a wide sandy plain 352 feet above lake Superior (328 Willmott), but is dammed by a terrace rising 20 feet above it. Another terrace rises to the north of Wawa lake to a height of 70 feet above its surface, according to Prof. Willmott, or 420 feet above lake Superior. Prof. Willmott finds a still higher beach (441 feet) near Whitefish lake to the north.

A magnificent set of terraces may be seen from the lake along the mountainous shore near Dog river about 15 miles west of Michipicoton Post. These were measured

Terraces at Dog River.

by Lawson, who gives seven elevations ranging from 16.5 to 323.4 feet above the lake. Our measurements were made at a point where the lower terraces have been cut away by the present lake, so that the lowest reading of a distinct terrace is 119 feet, though several indistinct stages may be seen a few feet below, probably representing Lawson's level at 100.7. Another set of readings gives 252 feet (Lawson's 255.4) with several less distinct beach ridges below. Our highest level is 360 feet, with numerous ill-defined ridges beneath. It is probable that Lawson's measurements were made somewhat farther east, where the lower series appears to be more complete.

Lawson measured no beaches between Dog river and Jackfish, a distance of over 80 miles in a straight line towards the northwest, and

we saw no high level terraces except at Pucaswa river. Along this river three terraces were measured at

Measurements on Pucaswa and Swallow Rivers.

99, 150 and 271 feet respectively, but with only one aneroid and a single reading each. More doubtful ones were found at about 430, 610 and 645 feet, near its headwaters. Beautiful examples of low level beaches consisting of well rounded but lichen-covered stones occur two or three miles west of Pucaswa, rising 16 and 42 feet above the water, but evidently forming a continuous series with the present beach, whose highest level of rounded boulders still uncovered with lichen stands six feet above the lake. At Swallow river ten miles northwest quite similar beaches rise 45, 54 and 63 feet above the water, with round lichen-covered stones. They are apparently quite recent, since no bushes nor other vegetation except lichens have obtained a foothold. They represent perhaps Taylor's Nipissing beach, or possibly his Sault beach.³⁴

It is rather singular that no distinct high level terraces are to be seen on this part of the shore, since the valleys between the mountains seem as suitable to receive them as those to the east or those to the northwest. Excursions to high inland points near Swallow river and Spruce harbor disclosed nothing of the kind.

A very interesting group of beaches is to be found in the western end of Michipocoton island, both on the north and on the south

Beaches on Michipocoton Island.

sides, easily examined on the road leading over the hills from the Quebec mine to Quebec harbor. There are several fairly distinct sets of gravel beaches, each having a number of ridges below the highest one. The lowest one is from 15 to 22 feet above the water and is marked by a fine sea cave whose floor is at the lower level. Next come indistinct beach lines running up to 65 feet above the lake, where a terrace affords space for several houses. Above this there are faint stages culminating at 78 feet, and then apparently a gap until

³³Bur. Mines, Ont., 1897, p. 193.

³⁴Am. Geol. vol. xx., Aug. 1897, p. 127.

128 feet, when fairly distinct wave lines begin and run up to 178 feet. At 204 feet there is a well marked gravel beach, perhaps just the highest stage of the last series; and at this level on the south side of the divide a lake is found, probably dammed by a beach deposit. Above this there is a wide terrace occupied by a farm, its highest point being 233 feet. There is a lake at this level also. The highest terrace observed reaches 295 feet. The terrace lying somewhat above the 400-foot level, found at so many points to the east and south-east, was not observed, but may yet be found among the higher hills of the island, which were not explored. A comparison of the series of beaches just given and those of Dog river 35 miles to the northeast, as measured by Lawson, shows comparatively few points of agreement, the only exact one being the level of the lowest beach in each, 15 and 16½

feet respectively. Whether there has been differential elevation, placing the beaches at Dog river higher than the corresponding beaches at Michipocoton island is hard to determine, particularly when one recalls that almost all of these beaches are composite and have a range of a number of feet.

The results of our observations summed up in the accompanying table giving 20 sets of beach levels near St. Mary's river and along the coast of lake Superior for 120 miles towards the northwest show a great number of slightly different levels. One may pass from the present lake shore up to beaches 475 feet above it with a succession of steps at one point or another, never exceeding 10 feet at a time; while the difference in level between the top of a storm beach at the present day and the subaqueous terrace of a delta now

Results of
Observations.

Level of Raised Beaches (on L. Huron and L. Superior) above L. Superior.

Above L. Su- perior 0.	Swallow R.	Kilkenny.	Pucawia R.	Michipocoton Island.	Dog R.	Michipocoton Post.	Gargantua.	Sault R.	Agawa R.	Montreal R.	Manahse R.	Bachawana R.	N. of Goulais R.	S. of Goulais R.	N. W. of Soo.	Gros Cap.	N. of Soo.	Garden R.	Sugar Island.	Bruce Mines.	Thessalon.	Collingwood.	Owen Sound.
50....	6 16 45 54 63	42	15 202	65 78	38	75 83 99	72 72		33	35 58	25 35			57	39	56	14 44	23 56		5	40	28	3
100....			99	78													89			77			
150....			128 150 to		119	136		144	111		104		102 113		136			128 137 150	121	111		103	
200....			178								184		187	191		185	192			170	155	186	
250....			204 233			240		234	214						224	229 244							
300....			271	295	252			257					285	277						274		267	
350....														304		327							
400....					360	352 372							333	362		379				354	383		
450....			*430			*420								432	442	441 447	*435			409 432		447	
500....																							
			610? 645?												502 506							919	

* About.

forming on lake Superior would certainly be more than 10 feet, and probably not less than 15. It must of course be remembered that heights determined by aneroid, particularly when the readings are two or three hours distant in time from the level with which they are compared, are not certain within the limits of a few feet.

Turning to Lawson's 48 feet precisely leveled beaches as given in his table of the terraces and beaches on the north side of lake Superior, the same peculiarity is evident.³⁵ The levels ascend to 260 feet without a gap greater than 14 feet, and in most cases by stages of less than ten feet. Lawson himself assumes that there may be a difference of level of 15 feet in different parts of the same beach, but then proceeds to group the abandoned strands in 33 sets, the levels of each set varying among themselves less than 13 feet. However in a number of these groups of levels the highest of one group approaches very closely to the lowest of the next above, and it seems doubtful if most of his horizontal strand lines are to be looked on as produced by sharply distinct stages of the water. It seems more probable that the change was on the whole a very gradual one, with few well marked halts in the fall of the water.

With regard to differential elevation toward the northeast the evidence is indeterminate. There is no well defined shore like the Iroquois beach around lake Ontario on which one may drive for a hundred miles, and so determine with precision the differences of elevation; and the usual occurrence of several wave-built ridges each three or four feet higher than the last one makes the comparison of one set with the next ten miles off very difficult.

An attempt has been made to distinguish the beaches representing Taylors's Algonquin, Nipissing and Sault water levels, but with little success on the whole. Probably the beaches running from 432 to 475 feet in the neighborhood of the Soo correspond to the Algonquin beach, though they seem somewhat too high, but the correlation of the others would be largely guesswork.

³⁵ Geol. Nat. Hist. Sur. Minn., 20th Ann. Rep. or 1891, p. 289.

Glacial Geology.

Owing to the immense amount of wave erosion along all the shores examined, often up to a height of 450 feet or more, the sheet of till which originally covered much of the region has largely been removed to be redeposited as stratified clay in the lower terraces; or else has been buried out of sight by lacustrine deposits. Typical boulder clay is generally to be seen however in valleys or sheltered spots above the beach lines; as, for instance, on the ridge 800 feet high crossed by the road from the Sault to Goulais river, and the similar ridge forming the water shed between Goulais river and Batchawana bay. At these points one sees stony till, sometimes with rough morainic shapes. Near Day's Mills, on the main road towards Thessalon, which lies some miles to the west, a very stony morainic ridge occurs, and has in part been worked over by wave action, all the finer materials being removed at the level of an old beach.

Pebbles of the Glacial Drift.

The materials left by the ice include an immense variety of rock species, largely from neighboring localities; such as the splendid boulders of jasper conglomerate at Bruce Mines, evidently derived from the Huronian just to the north. The only rock undoubtedly brought from a distance is limestone, often accompanied by chert. Pebbles and small boulders of this rock were found at a number of points among the beach gravels, but nowhere south or east of Doré river. As many of these pebbles are fossiliferous a collection of the best specimens was made in order to determine the age of the rock, and if possible its source. The fossils were given to Mr. B. E. Walker of Toronto for determination, and his kindness in working over the material, most of which was fragmentary and badly preserved, is much appreciated.

Mr. Walker finds *Atrypa reticularis*, *Favosites Emmonsii*, *Rominger*, fragments of cyathophylloid corals, of stromato-poroids, a small pebble of a syringostroma, and a fragment of clathrodictyon, apparently *C. laxum*, Nicholson; forms belonging mainly or wholly

Erosion of
the Till on
the Shore
Lines.

Rock
Materials.

Determina-
tion of
Fossils.

to the Devonian. The favosites is Upper Helderberg or Corniferous, while *atrypa* may be either Upper Silurian or Devonian.

Some limestone and chert pebbles were obtained also in the railway gravel pit east of Peninsula, and another pit west of Bremner. In the latter case there were many white limestone pebbles.

The source of these Devonian pebbles is probably the area of Devonian limestone near James bay, the nearest point of which as mapped by Dr. Bell is only 150 miles away in a direction about N 20° E, five degrees more to the eastward than the average direction of the striae. Dr. Bell found similar pebbles in the drift to the north and east³⁶, and Logan found Devonian pebbles near Pic island.³⁷

Glacial Striae.

Glacially polished and striated surfaces are numerous, and many directions of striae were noted by Murray on his map of the original Huronian region; the average of 38 readings being s. 15° w., two-thirds of them lying between s. 12° w. and s. 25° w. He notes one set of striae running south and two running east of south (s. 2° E. and s. 30° E.), both in the Goulais Bay region. In our own work few observations of striae were noted, as Murray had covered the ground so well, and only two need be mentioned. Near the summit of Tip Top mountain, seven miles east of Spruce harbor, striae were found about 1,500 feet above lake Superior with a direction of s. 50° w.; and a point of quartzite on the east side of Echo lake was found to be splendidly polished and striated in more than one direction, in some cases with chatter cracks. The latest and strongest striae run s. 70° w.; another set though somewhat variable are quite distinct and run s. 40° w.; while a few others point s. 55° w. The directions noted by Murray are s. 55° E. and s. 70° E. on the south side of Echo lake. The latter body of water is enclosed by precipitous hills almost deserving the name of mountains, and the chief direction of striae corresponds to the direction of the shore, having been made

perhaps during the retreat after the last advance of the ice, when the mass was no longer thick enough to over-ride local obstructions and so conformed in its movements to the direction of the deeper valleys.

At Rydalbank also, a few miles north of Bruce Mines, two sets of striae were observed, an older one s. 20° w., and a later one presenting only a few striae crossing the others with the direction s. 45° w.

The Original Huronian Area.

As rocks generally called Huronian furnish most of the ore deposits of Ontario, the question of the character of the Huronian rocks and their relationship to the Laurentian is one of much importance, not only to the man of science, but also to all who are interested in the development of our mineral resources.

The Huronian area first described and carefully mapped by Sir William Logan and his assistant Murray extends along the northeast shore of lake Huron from Blind river almost to Sault Ste. Marie, another smaller area being shown between Goulais and Batchawana bays on the southeast corner of lake Superior. Laurentian rocks are represented as separating the two, but the interior of the country is left a blank. Later explorations by Bell and others connect these two areas and extend them as a broad band to the Sudbury region on the northeast.

The region was first examined by Logan and his assistant in 1848, a short report on the North Shore of Lake Huron being published the following year giving a preliminary sketch of the geology. Logan's attention was turned to the region on account of the copper mines then being opened up near Bruce Mines.³⁸

The work begun by Logan was carried on by Murray in 1857 and 1858, the results with uncolored maps and sections being published in the reports of the Survey for those years. In the large report of 1863 Logan's views as to the Huronian are summed up and the results of his and Murray's work published with an excellent map which, though on too small a scale, was the most detailed map of any Canadian Huronian region up to

³⁶ Geo. Sur. Can., 1870-71, p. 349. ³⁷ Ibid. 1866-69, p. 353.

³⁸ Geol. Sur. Can., 1849.

the time of Dr. Lawson's work on the Lake of the Woods. Since Logan and Murray's time Irving³⁹ and Van Hise⁴⁰ have visited some of the typical localities and described critical points in order to correlate the corresponding series of rocks to the south and west of lake Superior. The Winchells also have visited the region and published descriptions of portions of it.⁴¹

While Logan and Murray's chief work was done in the region near St. Mary's river, they also examined areas which Logan describes as of the same age in various other parts of Canada, particularly near Doré river west of Michipicoton, and lake Temiscaming on the boundary between Ontario and Quebec. In fact in the account of the Huronian in the Geology of Canada, 1863, Logan begins with the Temiscaming rocks, goes on to the Doré section and ends with the original Huronian region. That he considered the three as of equivalent age is evident.

Rocks of the Thessalon Trough.

Logan's study of the Huronian, or Lower Copper-bearing series, began at Brace Mines, but Murray followed up the work in various other parts of the region, especially along the lakes and rivers, tracing out in particular the easily recognized bands of limestone. He finds a rather complex series of faults intersecting the series, which are also thrown into two rather gentle folds with a dip ranging from 0° to 45° in a section worked out in the Thessalon trough. The series of rocks near Thessalon is given by Logan in ascending scale as follows :

1. Gray quartzite	500 feet.
2. Greenish slates	2,000 "
3. White quartzite	1,000 "
4. Slate conglomerate	1,280 "
5. Limestone	300 "
6. Slate conglomerate	3,000 "
7. Red quartzite	2,300 "
8. Red jasper conglomerate	2,150 "
9. White quartzite	2,970 "
10. Yellowish chert and limestone	400 "
11. White quartzite	1,500 "
12. Yellowish chert and impure limestone	200 "
13. White quartzite	400 "
18,000	

³⁹ U.S. Geol. Sur., 7th Ann. Rep., "Classification of the Early Cambrian and Pre-Cambrian Formations," R. D. Irving.

⁴⁰ Ibid., 16th Ann. Rep., "Principles of North American Pre-Cambrian Geology," C. R. Van Hise.

⁴¹ 16th Ann. Rep. Geol. and Nat. Hist. Sur. Minn., 1887.

In addition there are overflows of greenstone, dikes of the same rock and eruptive bosses and dikes of granite.

The series of rocks here presented is so widely different from the rocks usually classed

with the Huronian in western Ontario that one readily understands why Lawson gave the western series a distinct name, the Keewatin, and doubted whether the two series are of the same age. It is proposed to describe briefly the various rocks of the series as examined by us last summer, comparing them with the so-called Huronian rocks of the Rainy lake region and drawing some inferences as to the conditions of the time and the relations of the Huronian to the Keewatin and Laurentian.

It will be convenient to take up the series in the reverse order, starting with the latest, and ending with the earliest.

Logan's No. 13 and 12, white quartzite and yellowish chert and limestone, we did

not see ; but similar rocks, probably No. 11 and 10, occur on the south side of Ottertail lake where the exposures are not very good. Besides the white quartzite there is a band of brownish rock looking like felsite, probably arkose, since under the microscope one finds all the customary minerals of granite. The thin section might easily be taken for a microgranite but for the rounded particles of quartz with a faint dusty margin suggesting a clastic origin. Impure limestone with brown chert occurs near the southeast corner of the lake.

No. 9, white quartzite, shows much better than the limestone just to the north of Ottertail lake, as might be expected from its more durable character. Good examples may be found near the south end of Great Lake George also. They are clearly granular though well cemented, and look quite different from any western quartzites or the friable sandstone of the Couchiching near Fort Frances. They are usually quite free from darker ingredients, and almost as white as marble.

The famous jasper conglomerate (No. 8) attracts the eye instantly with its blood red jasper pebbles and black pebbles of chert in a white ground mass of quartzite. Looking more closely, pebbles

of white quartz are seen also. The jaspers have not the oölitic look often found in the jaspers of the iron bearing rocks west of lake Superior. They are very unequally distributed, and but for their brilliant color would be neglected in naming the rock, since the portions sprinkled with them form really very subordinate parts of the rock and merge on all sides into ordinary quartzites, or quartzite conglomerates with white pebbles only. These rocks are fairly well displayed a few miles north of Rydalbank on the road between Ottertail and Rock lakes. The best example seen by us is one not shown on Logan's map, on the northern shore of Trout lake, a small body of water two or three miles north of Echo lake; and they are found also a mile or two farther north on the pond called Iron lake. On Trout lake the band is 300 or 400 yards wide, strikes about 140° and dips about 35° to the northeast. It is probably part of a band lying roughly parallel to the one shown by Logan as running from Great Lake George past Rock lake to a point not far from Thessalon; and may represent the same bed of rock on the north side of an anticline.

The red quartzite (No. 7) is really arkose, consisting of rounded grains of quartz, weathered grains of various felspars, dusty interstitial particles and sometimes iron oxides. Good examples occur just west of Rock lake and also three or four miles west of Campement d'Ours. This rock, where studied by us near Rock lake, passes by gradations into jasper conglomerate and sometimes contains jasper pebbles, which are however not very conspicuous in their setting of brownish red sandstone.

After passing Rock lake on the road north from Bruce Mines to the Ophir mine, Logan's upper slate conglomerate (No. 6) appears, rising as a steep hill.

Parts of it contain few or no pebbles but other parts are more or less crowded with large well rounded boulders, mostly of red granite, less often of gneiss. The same rock may be studied on the southern shores of Echo lake, where greenish quartzite is seen first, and afterwards what may be called graywacke conglomerate, in general a fine

grained gray rock with light and dark colors curiously mingled, in which large and small pebbles of red granite are common. Dark gray green pebbles coarser in grain than the matrix also occur, and a mass of quartzite with irregular outlines was seen partly enclosing a granite boulder. Paler greenish parts of the matrix seemed to be enclosed with bands of darker green, showing a grain like that of wood about a knot. One small pebble of red jasper and a pebble of buff limestone were found. It is probable that this graywacke conglomerate obtained part of its materials from the massively developed conglomerate of a similar kind not far to the north. The pebble of limestone probably indicates an interval of erosion after the consolidation of the next member of the series. Pebbles of limestone are more commonly found in the same band of graywacke-conglomerate north of Garden river, as reported by Van Hise.⁴²

One of the most interesting rocks in the whole series is No. 6, which consists of limestone. On Echo lake it forms two promontories on opposite sides of the lake, as if it withstood weathering better than the other rocks of the shore. Approaching it on the western shore one sees first greenish slate containing a few granite boulders intricately interfolded with brownish gray limestone, as if they had been interstratified. Turning the point there is a shore of wonderfully contorted limestone, "exhibiting on a small scale a beautiful representation of almost all the accidents that occur in stratification," to quote Sir Wm. Logan.

On weathered surfaces shaly bands stand out as darker colored ribs. In the middle of the band there is a conglomerate of small flat, but rounded, limestone pebbles in a limestone matrix, well seen on the weathered rock, but almost invisible on fresh surfaces. Some of the pebbles suggest shells, though clearly not of organic origin. In thin sections the rock proves to be a fine grained, fairly pure calcite with a few dusty looking strips of darker color, where black particles and tiny grains of quartz show themselves.

⁴²Pre-Cambrian Geol., p. 777.

Several narrow dikes of diabase and one of amygdaloid cross the limestone.

The limestone band shows the contortions seen when a softer rock is squeezed and folded between bands of harder rock, so that the dip is not easily determined. The prevalent dip seems to be about 20° towards the south.

The quarry at Garden river presents a fine exposure of the same limestone, but there the dip is 70° or 80° towards the south. A similar band of limestone, classed on Logan's map with the ones just described, occurs near the Wellington mine, and is crossed by the railway at mile 142, a mile east of the Bruce Mines station. Here it contains flat black pebbles of slate, and has apparently a vertical dip.

In general these limestones are not very crystalline, and might be paralleled by many limestones of far later age. The limestones of Steep Rock lake above Rainy lake are very like them, both on the large scale and under the microscope.

Another band of rather less pure limestone occurs on the east shore of Echo lake, some distance to the northeast of the band shown on the map. The impurities are mixed more thoroughly through the rock and do not stand out as prominent ribs on weathered surfaces.

The lower slate conglomerate (No. 4) is seen to fine advantage north of the main limestone band on Echo lake, where it rises 500 feet as a steep cliff, with a talus of large blocks beneath. It is a graywacke conglomerate with some quartzite. The pebbles and boulders are very unequally distributed and consist of granite, felsite, quartzite and greenstone, no limestone or jasper being found. On the map the same conglomerate is shown along the shore at Bruce Mines. About three miles west of that village several finely glaciated "whaleback" islets display splendid sections of this rock with well rounded boulders, mainly of red granite in a dark green ground mass. Some of the boulders are three feet in diameter. Graywacke conglomerates of the type described under No. 4 are common farther northeast in the same great Huronian band, and may be seen in the Wahnapiatae gold region near Sudbury. Parts of them

are very like parts of the Shoal lake conglomerate of the Rainy lake Keewatin, though in general the Shoal lake rock is much more schistose.

Subdivision No. 3, white quartzite, is mapped as occurring along the shore between Bruce Mines and the peninsula west of Thessalon, and then as stretching some miles to the northeast till cut off by a fault. The point of the shore east of Bruce Mines consists of red quartzite or arkose, but the rest of the shore was not examined by us. Where the band is crossed by the railway as it approaches Thessalon from the west gray quartzite is found ($\frac{1}{4}$ mile east of mile 140) with some black chert pebbles as well as pebbles of white quartz and a few of jasper. At this point the beds seem to be horizontal, though the limestone band two miles to the west appeared to be vertical. East of mile 140 as far as mile 135 red quartzite is the main rock seen, often cut by large dikes of diabase. It contains red felspar and a few chert pebbles, and the bedding seems to be generally horizontal, though variations of dip from 0° to 45° occur. This subdivision is wanting north of Echo lake, the green slate coming in immediately after the lower slate conglomerate.

No. 2, green chlorite slate, is mapped as a band running northeast of Thessalon to a line of fault, and also at the north end of Echo lake. At the latter point it rises as a splendid cliff, with what appears to be nearly horizontal bedding. The rock is a very cleavable gray green slate or phyllite, consisting of chlorite with some calcite (or dolomite) and angular particles of quartz with a few grains of magnetite. None of the rutile needles characteristic of most slates can be seen in a thin section. There are Keewatin slaty rocks of an exactly similar kind in the Lake of the Woods region.

The rocks mapped as of the same age near Thessalon are apparently all more or less altered basic eruptives or ash rocks. A dark green sausuritic rock with lighter parts of material richer in epidote presents various phases of crush conglomerates and agglomerates. In other parts little structure is to be seen, and in still others, e.g., at a point in Thessalon harbor, there are very distinct

White
Quartzite
No. 3.

Green
Chlorite
Slate.

Lower Slate
Conglomer-
ates.

beds of amygdaloid, generally thin and separated by beds of weathered diabase without the amygdaloidal structure. The amygdules are of darker green than the rest of the rock, and are filled with serpentine. These amygdaloids must have been successive flows of lava. No rocks of the sort have been described from the western Keewatin.

The last subdivision (No. 1) recognised by Logan is mapped as forming a narrow band just beneath the green slate and between it and the Laurentian, starting at the shore three or four miles east of Thessalon and running in a northeasterly direction till cut off by the great fault to the north. He describes it as "gray quartzite, thin bedded in some parts; the thickness very doubtful"; and puts the thickness at 500 feet. We coasted somewhat carefully along that part of the shore and also crossed the strike of the band on the railway to the north, but saw no rock corresponding to the description. However a thickness of only 500 feet might be covered with drift and pass unnoticed. What we did observe was a basal conglomerate, overlooked by Logan, but well described by Irving⁴³ and Van Hise.⁴⁴

Gray
Quartzite,
Logan's
No. 1.

A Water-
formed Rock
older than
Logan's
No. 1.

As this is a crucial point in reference to the relation of the Huronian to the Laurentian, we studied it with considerable care. A shoal of small islands along this part of the shore gives excellent exposures, making it the more surprising that Logan and Murray, usually so keen-eyed, should have overlooked them.

The rock may be described as a graywacke conglomerate, in which the cement is dark gray and rather coarse, containing grains of quartz and feldspar; while the pebbles and boulders are very unequally distributed, as in most graywacke conglomerates. The pebbles and boulders are mainly of granite and gneiss, evidently derived from the underlying Laurentian. In addition there are felsites or quartz porphyries and a few darker pebbles belonging to the hornblendic masses enclosed in the Laurentian. Very rarely one finds a small pebble of red jasper. The last point

has some importance, as showing that this conglomerate is not the lowest of all sedimentary rocks. The inference drawn by Van Hise from the jaspers in the red jasper conglomerate of the Upper Huronian, that these are derived from the red jaspers associated with certain parts of the Lower Huronian⁴⁵ will apply here also. If jasper is necessarily Huronian the basal conglomerate near Thessalon represents the base of the Huronian at that point only; and in other regions Huronian rocks of an earlier age are to be found.

In order to study the contact at a fresh point we walked east from Thessalon along the railway and found it rising as rounded hills in a swamp south of the track about half way between mile posts 127 and 128. The graywacke conglomerate here presents the same character as on the shore, and is crowded with large and small boulders of gneiss and granite like the Laurentian rocks to be seen beneath it.

A hill lying about half a mile north of the road between Sault Ste. Marie and Garden river presents perhaps the same contact; but the evidence does not seem to me clear, since the conglomerate or rather breccia consists wholly of granitic material and is possibly a crush conglomerate formed by faulting instead of a water-formed rock.

The contact of Laurentian and Huronian was looked for north of Garden river in territory unmapped by Logan; but owing to the widespread lake deposits it was not to be seen. The first rock met after passing the "slate conglomerate" hill lying north of the Garden river limestone band is reddish gneiss or granite and a gray gneissoid rock penetrated by granite dikes, the whole no doubt Laurentian.

The eruptive rocks associated with the Huronian are considered by Logan to be partly contemporaneous flows, and partly later eruptives penetrating the Huronian. The large mass of greenstone in which the copper veins are found at Bruce Mines, Logan thinks to be an intrastatified bed, and he speculates as to its

⁴³U. S. Geol. Sur., 7th Ann. Rep., p. 429, etc., with several full page illustrations.

⁴⁴Pre-Cambrian Geology, p. 777.

⁴⁵Pre-Cambrian Geology, p. 778.

thickness and the depth to which the veins may be followed in it as country rock.⁴⁶

Our observations do not bear out this theory. On a point less than a mile east of the mine, and on an island just beyond, we found an eruptive contact of exactly similar diabase with red quartzite, many dikes of diabase branching off from the main mass into the quartzite, at times crossing it in parallel sheets with much regularity as if interstratified, at others cutting it irregularly. The Bruce Mines diabase, which is quarried and shipped to Cleveland as road metal, contains a little quartz as a micropegmatitic intergrowth with the plagioclase; and the same was found to be true of the striking hill rising a mile inland from the head of Great Lake George; so that quartz diabase seems to be the prevalent type. It is not certain that any of the diabase masses seen by us are surface flows, all the evidence observed being to the contrary. That there were contemporary lava flows and volcanic activity is however proved by the successive amygdaloid beds at Thessalon with their accompanying beds of ash rock and agglomerate.

Eruptive masses of granite penetrate the Huronian, as observed by different geologists who have visited the region, but none of them were particularly studied by us. In appearance there seems little or no difference between them and the eruptive granites of the Laurentian, though the large number of granite boulders in the graywacke conglomerates proves that granite was a very important constituent of the Laurentian before the Huronian was deposited.

Components of the Rocks.

An interesting set of problems is presented in regard to the source of the materials of the typical Huronian rocks. Except at the small section east of Thessalon, where the basal conglomerate overlies the Laurentian and is made up of the rocks at hand, it is not at all easy to suggest an origin for them. If we sum up the various rocks of Logan's section, placing gray and white quartzite and jasper conglomerate together as having essen-

tially the same composition, we have five main series, of which rocks formed mostly of quartz make up 8,520 feet; graywacke conglomerate, containing a good deal of quartz with some basic material as well as many granite boulders, forms 4,280 feet; red quartzite, largely arkose or crushed granite or gneiss, reaches 2,300 feet in thickness; slate, really phyllite or a chloritic slate, 2,000 feet; and limestone with chert 900 feet. When it is remembered that the Laurentian so far as known in the region contains no quartzite and few quartz veins, the origin of the many cubic miles of nearly pure quartz in the 8,520 feet of quartzite is not easy to find. If derived from granite and gneiss, at least four times the bulk of these rocks must have been ground up and the clayey and other materials removed. The 2,300 feet of red quartzite or arkose and the 4,280 feet of graywacke conglomerate with the more or less numerous boulders may be conceived to have come rather directly from the Laurentian. The 2,000 feet of chlorite slate or schist may represent the more basic and finer grained materials of the granites ground up to form the quartzite. The materials for the 900 feet of limestone could only be supplied by some of the basic silicates, such as anorthite or labradorite; for crystalline limestone has never been reported from the Laurentian of the region.

The most puzzling components of these rocks are however the pebbles of jasper and chert. While they occur especially in the 2,150 feet of jasper conglomerate, they are found to a greater or less degree right at the base of the series. We found numerous chert pebbles and some of jasper in Logan's white quartzite, No. 3, and a few red jaspers turned up in the basal conglomerate east of Thessalon, the lowest of all. Now jasper and chert or Lydian stone are unknown in the Laurentian. They are well known as members of the Animikie, classed by some American geologists as Lower Huronian. Both the jasper and the chert are found elsewhere as stratified sedimentary beds of the Huronian, but not in the Keewatin. The jasper pebbles though not of great importance as to bulk are present often in large

Suggestive-
ness of the
Jasper and
Chert Peb-
bles.

Source of the
materials of
Huronian
Rocks.

⁴⁶Geol. Sur. Can., Report on North Shore Lake Huron, 1849, p. 45.

numbers and are very widely spread. Logan maps them as a continuous band 26 miles long, and adds another small area beyond, giving a total length of distribution of nearly 50 miles, and they are found more or less across a width of 15 miles.

The most probable source of these pebbles is some area of jasper like that west of lake Superior, but now completely removed, or lost to sight beneath one of the great lakes. Whatever the source of the jasper, these pebbles prove the presence of a non-Laurentian rock in considerable quantities before the earliest bed of the typical Huronian was laid down. The typical Huronian is therefore not the earliest sedimentary rock, nor is it the next rock in succession after the Laurentian.

The Laurentian of the Region.

The Laurentian of the region was studied at various points with some care, particularly east of Thessalon where it rises from under the Huronian basal conglomerate. On the islands four miles east of Thessalon the Laurentian consists of red granite and granitoid gneiss of the usual type. In both rocks there are large angular fragments of a dark gray hornblendic rock just like the hornblendic schist often found on Rainy lake, where there is an eruptive contact of the Laurentian gneiss with a basic Keewatin schist. In that region on finding such inclusions one would expect to find the solid green schist shortly after. A thin section of a specimen of the schist inclusions shows the rock to be a quartz-hornblende schist with a little orthoclase very similar to some Keewatin schists near the Laurentian contact.

Along the "Soo" line railway at mile 127, just east of the basal conglomerate, typical, well-foliated Laurentian gneiss is found, once more containing many angular inclusions of green schist; and from mile 123 to Dayton wide bands of fine-grained gray schist very like Keewatin or Couchiching rocks occur in the gneiss, the latter making an eruptive contact. At some points granite erupts through both. If these rocks were found on the Lake of the Woods or Rainy lake there would be no hesitation in assigning them to the Keewatin.

North of Garden river, near the Victoria mine, Laurentian gneiss penetrated by granite dikes and enclosing masses of green schist occurs, but part of the green schistose rock appears to be a sheared dike of greenstone, and so may be later than Laurentian.

The Laurentian to the west of the typical Huronian region may be seen on the road across the mountains from Sault Ste. Marie to the Goulais River settlement, where a gray gneiss, often greatly contorted, contains strips or larger fragments of green schist resembling the Keewatin.

Huronian Areas on Lake Superior.

Besides the original and typical region of Huronian rocks north of lake Huron, there are a number of areas along the eastern and northern shores of lake Superior which have usually been classed and described as members of the same series. These latter have been studied by us with the object of comparing them with Logan's original Huronian on lake Huron and Lawson's Keewatin on Rainy lake.

The Goulais-Batchawana Contacts.

Logan maps an area of Huronian between Goulais and Batchawana bays near the southeastern end of lake Superior, coloring it chiefly as upper slate conglomerate, though a small patch of jasper conglomerate is shown on Goulais bay. We spent three or four days in the region, mainly examining the contact of the Laurentian and Huronian. Passing north from Goulais river by a road leading over a pass to Batchawana bay one finds quite a variety of Huronian rocks. At a school house south of McAuley's post office a steep hill consists of beds of felsite alternating with very cleavable slate, both having only a gentle dip. At McAuley's itself the rock is characteristic slate conglomerate. Two or three miles southeast of McAuley's the highest point in the region is found to consist of white quartzite, which apparently overlies slate showing a well defined cleavage nearly at right angles to the equally well-marked bedding.⁴⁷ The quartzite rises to a

⁴⁷ Geol. Sur. Can., 1863-66, p. 127. Macfarlane briefly describes the Huronian rocks near Goulais bay and mentions quartzite.

height of more than 1,300 feet above the lake and must be several hundred feet thick.

Half a mile north of McAuley's, as one ascends the pass, felsite schist is observed with a strike nearly north and south and a dip of about 45° to the east. On the steep wooded hillside to the left of the road, coarse syenite gneiss is found in contact with a felsitic rock, probably the same as that seen along the road. The gneiss is not markedly foliated, but seems to strike about 60° . It encloses large masses of felsite and also green schist resembling the Keewatin. The felsite schist just referred to looks very like certain Upper Keewatin rocks of the west, and is not mentioned by Logan as belonging to the typical Huronian. Its exact relation to the graywacke conglomerate at McAuley's was not clear, the intervening ground being drift-covered. The gneissoid rock is clearly eruptive as regards felsitic and also chloritic schists; the latter may however be of earlier age than the main mass of Huronian, and may correspond to the Keewatin-like bands observed in Laurentian gneiss east of Thessalon.

Part of the shore to the north of Great Gros Cap was carefully coasted so as to examine the area mapped there as Laurentian. Rounding the point, which is formed of red Keweenaw porphyry and diabase of unknown age, one finds coarse red granite or syenite, sending dikes into a foliated hornblende rock, in some places forming a giant breccia. Still farther north, well-foliated gneiss shows on the cliffs and encloses dark lenticular inclusions. The gneiss here dips 40° to 70° to the west. Beyond this the shore consists of low, flat-lying St. Mary sandstone.

On Batchawana bay much of the shore near the mouth is of sandstone, but going farther in on the southeastern shore slate conglomerate is found, the sparse pebbles being chiefly granite, though greenstone and quartzite also occur. Bosses of red granite penetrate it. Not far from this, as observed by Professor Willmott, a band of porphyritic granitoid gneiss cuts across the slate conglomerate eruptively, perhaps the band mapped by Logan as syenite. "The gneiss holds angular inclu-

sions of basic schists, the whole closely resembling the Keewatin contacts of the Lake of the Woods." Similar coarse red porphyritic gneiss appears at a point on the east side of the bay, and there includes green schistose hornblende rocks, the gneiss showing a rough fluidal structure enclosing the greenstone masses.

On the north shore of the bay a patch of Huronian conglomerate consisting of boulders of granite, cemented by a greenish matrix, rests against the southern flank of a range of Laurentian hills. The Laurentian is a coarse, slightly porphyritic, gray gneiss. Just south of the conglomerate there is a black slaty rock with some quartzitic bands. The contact looks eruptive, and the boulders of the conglomerate as far as observed do not resemble the adjoining gneiss; while at one point the rock at the contact is slaty, not conglomerate. The rock exposures here are however not clear enough to give absolute evidence.

On the whole the results of our examination of the Goulais-Batchawana Huronian contacts suggest that the Laurentian here has an eruptive relationship to the Huronian. As the supposed Laurentian gneiss has not been studied on a large scale, however, it is possible that the rocks referred to that group might be described by another observer as foliated granites later than both the Laurentian and Huronian. The fact that large bands and angular inclusions of basic schist closely like the western Keewatin are included in gneissoid rocks of Laurentian habit cannot however be disputed. A clear example of a typical Huronian rock, such as a quartzite, a jasper conglomerate, or a graywacke conglomerate, being enclosed eruptively in Laurentian gneiss has not been observed by us in the region; though three cases have been found of what appear to be eruptive contacts between Laurentian-looking gneissoid rocks and rocks that appear to be true Huronian, one near McAuley's, another on the south side of Batchawana bay and the third on the north side.

The Huronian of Dore River.

Logan found several areas of Huronian on the north shore of lake Superior and pays spec-

North of
Great Gros
Cap.

A Laurentian
Habit
apparent.

ial attention to the rocks of Doré (or Pickerel) river, five miles west of the mouth of Michipicoton river. He gives an elaborate section of the slate conglomerates which occur there, describing them in detail up to a thickness of 1,700 feet ; the rest of the series, in all several thousand feet, being too much covered with trees and moss to examine satisfactorily.⁴⁸ We employed two or three days in the study of the Doré section, which is a continuation of the Huronian rocks of the Wawa lake gold district. The rock on the shore so carefully described by Logan is a characteristic schist conglomerate such as could be matched at many points in the Keewatin of Shoal lake or Lake of the Woods. The boulders observed are granites most frequently, then quartzites or sandstones with pebbles generally small, next green schists, then felsite schist and porphyroids, and finally a few gneisses, but none of the Laurentian type. In many cases the softer pebbles are greatly flattened and even bent around their harder neighbors. The most interesting of the boulders, or rather pebbles, for they are not often large, are the quartzites or sandstones. They are usually white, but sometimes yellow or brown, are fine grained and often so soft as to be pulverulent. Some of the smaller ones are nearly black and are probably the chert-like pebbles mentioned by Logan. Precisely similar pebbles occur in the Keewatin conglomerate of Shoal lake near Rainy lake ; and the parent rock must have been such a sandstone as that of the Couchiching near Fort Frances. It is interesting to note that Professor Willmott found bands of such sandstone two or three miles to the east on Little Gros Cap, near a deposit of iron ore. Very seldom a boulder of conglomerate occurs, the ones examined having the look of schist conglomerates. They are well rounded and somewhat flattened, like many other of the boulders adjoining. Two specimens collected may be described. One is six inches long by two inches in thickness, and consists of pebbles of felsite or felsite schist, yellowish to greenish in color, imbedded in a darker paste containing some smaller rounded fragments

Features of
the Doré
River Sec-
tion.

of the same rock. It seems to be a water-formed conglomerate, not an autoclastic rock. The other boulder when complete was about a foot long, but less than two inches thick, once well rounded but now rolled out somewhat flat. It consists of small pebbles of the bluish or white sandstone mentioned above, and of glassy quartz with a small amount of chlorite schist as cement.

The sandstones are distinctly stratified rocks, under the microscope often but not always showing a structure of grains having brownish or dusty partings from one another. Dark colored ones contain many black particles attracted by the magnet. A few scales of green chlorite are scattered through the quartz. One thin section contains a considerable amount of a carbonate. The other varieties of rock occurring as boulders do not require a particular description.

Off the shore from the mouth of Doré river are a few small islands of the same conglomerate. Including these, we made the width of the band of conglomerate about 2500 feet by micrometer. As the dip ranges from 70° to 90°, the thickness of the band is not very much less, so that the 1700 feet given by Logan may be increased by more than a third.

Doré river is very difficult to navigate from the succession of falls and flat rapids which it forms as it approaches lake Superior and was ascended about two miles only. The conglomerates continue along the crooked river for 2,200 feet, and allowing for curves this gives about 650 feet in addition ; so that the whole thickness of conglomerate cannot be less than 3,000 feet. Beyond this the rocks observed are mainly felsite schist with some green schist interbedded and a little very fine grained gray gneiss at one point, all having a strike about east and west or parallel to that of the schist conglomerate, and a nearly vertical dip, the lowest inclination observed being 75° to the south. The distance across the strike examined by us was about 1½ miles inland from the conglomerate. The rocks found can all be matched in the western Keewatin, none of them having any similarity to the typical Laurentian. The gneissoid rock mentioned is very like some of the Rainy Lake Couchiching. The felsite

⁴⁸ Geol. of Can., 1863, pp. 53-54. See also Macfarlane, *ibid.* 1863-66, p. 127.

schist here described probably represents the "reddish yellow felspathic layers" of Logan; which caused him to say that "towards the lower part it assumes more the character of the gneiss which usually succeeds it." Neither Logan nor ourselves examined the inland boundary of the Huronian.

As shown in an earlier part of this report, Prof. Willmott has followed the Doré conglomerate four miles east, almost to the peninsula of Little Gros Cap, with practically the same strike as at Doré, and in the gold region several miles farther to the east he has found areas of schist conglomerate which probably form a continuation of the Doré band. About a mile west of the river the schist conglomerate is penetrated by masses of diabase and greatly crumpled, the pebbles being rolled out thin, and fragments enclosed in the eruptive rock show vague outlines fading into the diabase as if partly fused. Beyond this point felsite breaks through the conglomerate, disturbing its strike and making the pebbles almost indistinguishable. Still beyond these is red granite, perhaps the parent mass of the intrusive felsites. Farther west along the shore large masses of schist conglomerate were seen enclosed in the granite, one containing a boulder of actinolite schist three by one and a half feet in dimensions. The largest mass of conglomerate is about 50 by 100 feet.

At Denison falls, near the mouth of Dog river, schist conglomerate again occurs, having a strike of 140° and dip of 80° to the east. These rocks have a more felsitic matrix than those at Doré however, and may not represent the same band.⁴⁹

Conglomerate is found again near Eagle river and between Pilot harbor and Pucaswa river, in the latter instance running as a narrow band for $1\frac{1}{2}$ miles along shore, the rock inland being felsite or porphyrite. It is not improbable that originally a band of conglomerate extended along the whole shore from Michipicoton river to a point east of Pucaswa river, a distance of at least 45 miles. The conglomerates being softer than

the felsite schists have been eaten away on many parts of the shore, and are interrupted also by eruptive masses of granite and diabase.

The general band of Huronian comes to an end at Otter cove, ten miles beyond the last observed outcrop of conglomerate. The gneiss apparently forms an eruptive contact with the Huronian near Otter head, but there are masses and dikes of granite penetrating both rocks more or less at that point, making the inference somewhat uncertain. No basal conglomerate was found.

It is worthy of attention that the Doré conglomerate, like that of Shoal lake, is not basal as regards the Laurentian. It is some thousands of feet above the base of the series of schists in which it is found, and contains no boulders that are distinctly Laurentian, only rocks belonging to the schists generally called Huronian and the eruptives often found in them.

The Doré conglomerate has been somewhat fully described, because it presents a perfect parallel with the Keewatin schist conglomerate of Shoal lake in the west, is like it in every way so far as general appearance, lithology and the steeply tilted position of the bedding are concerned, and yet is unhesitatingly placed in the Huronian by Logan. If this area is Huronian, as asserted by the founder of the system, it is hard to see why the western Keewatin should not also be included.

It must be admitted that the Doré rocks have on the whole a more ancient look than the typical Huronian north of the lake of the same name, and present, very few points of similarity to them either from the stratigraphical or the lithological side. There are no Jasper conglomerates, graywacke conglomerates nor limestones among them, and the schists which they present are more thoroughly crystalline than any in the original Huronian unless perhaps the chlorite "slate" near the base of that series. On the other hand some of the Doré schists are very like examples of the dark schists enclosed as bands or angular fragments in the Laurentian gneiss underlying the basal conglomerate of the Huronian east of Thessalon.

⁴⁹ The Dog River conglomerate is referred to in the Bulletin of Denison Univ., vol. 2-4, p. 123,

It seems tolerably certain that Logan included in his Huronian two series of rocks of quite different ages, the Huronian of lake Huron being probably much younger than the rocks so named on lake Superior. This conclusion is in agreement with Lawson's view, in accordance with which he gave the name Keewatin to the Lake of the Woods schist,⁵⁰ and compared them with the Doré rocks, distinguishing the latter from the original Huronian.

Schists of Heron Bay.

Another large area of schists mapped by Bell as Huronian, but not described by Logan, occurs 35 miles to the northwest around Heron bay, where the Canadian Pacific railway first touches lake Superior. Two days were devoted to a study of these rocks on the shores of the bay and along the railway to the west between Huron bay and Peninsula.⁵¹ These rocks are first met at the point turning northward from Pic river to Heron bay, where they consist of green schist and felsite schist with variable strike and dip, probably from the influence of the adjoining eruptive gneiss or granite which sends dikes into them. Rounding the point one finds schist conglomerate with a strike of 110° to 120° and a nearly vertical dip. These rocks are greatly sheared, so that the forms of the pebbles are almost indistinguishable except where lapped by the waves. A little way off they look very gneissoid. The conglomerate contains pebbles and boulders of all sizes up to blocks two feet long, mainly reddish or yellow granite or quartz diorite or porphyry, and green and dark gray basic rocks and schists. The matrix is generally dark green and more easily weathered than the boulders. In most cases the pebbles are considerably rolled out, and in parts they show only as bands of slightly varying color, or turn to felsite schists in which no pebble can be seen.

The strike and dip vary greatly, the former from 60° to 120° with an average of about east and west; and the latter from 40° or in

one place 30° to the north to verticality. The breadth across the strike is about four miles, from the point turning towards the mouth of the Pic to the railway station; and the distance followed along the strike is about 2½ miles. Going towards Peninsula the schist conglomerate is followed by green-gray, very fissile slate or phyllite, then a band of felsite schist with faint traces of flattened pebbles, then a band of dark gray slaty rock, a series of hard green agglomerates and near the Peninsula gravel pit by a large eruptive area. All the schistose rocks have dips running from 45° to the north to vertical. They are however a good deal disturbed by dikes of both acid and basic rocks. Whether the slates are lower or higher in the scale than the schist conglomerate was not settled. The unusual width of the conglomerate beds is worthy of remark. It may result however from close folding and not represent a continuous sequence of beds. The schistosity conforms in general to the bedding as shown by the bands of more numerous and less numerous pebbles. The rocks just described conform to the Keewatin rather than the typical Huronian type.

The general impression left by our summer's work in the region is that Logan has included two series of rocks of very different ages in his Huronian; that the series on lake Huron, the most carefully studied and the only one mapped in detail, is of later age than the Doré rocks and probably also than the western Keewatin (or Ontarian); and that in the typical Huronian region the Keewatin is probably represented by the bands and fragments of green and gray schists enclosed in the Laurentian gneiss and granite. If these impressions are correct the true succession in time is Keewatin, Laurentian, Huronian; the term Laurentian being confined to the areas of granite and granitoid gneiss corresponding to the Ottawa gneiss of eastern Canada, and having eruptive relations with the Keewatin. The suggestion just made implies an immense lapse of time between the Keewatin and also the Laurentian and the overlying Huronian. The gap between the Keewatin and the Huronian was long enough to permit of the Laurentian

⁵⁰Geol. Sur. Can., 1885, cc.

⁵¹Geol. Sur. Can., 1870-71, p. 328. Bell mentions "slate conglomerate" with dark green trap as the rocks east of the mouth of Pic river, but does not describe them.

gneiss erupting through the Keewatin rocks, and throwing them into closely folded synclines; after which the granite and gneiss consolidated at great depths and the whole mountainous region was carved down to a peneplain. On this the basal conglomerate of the typical Huronian was deposited.

The basal complex recognized everywhere as underlying the ordinary sedimentary rocks is considered by us to consist of two very distinct groups of rocks of quite different ages, the older one mainly of basic green schists but including also immense beds of schist conglomerate, the later one consisting mainly of moderately acid eruptives.

The Keweenaw Series.

In the field covered by last summer's work the Keweenaw, Logan's Upper Copper-bearing series, includes many basic

Characteristics of the Series.

eruptives such as diabase and amygdaloids, some acid eruptives such as quartz porphyry, quartzless porphyry and felsite, and also sedimentary rocks such as sandstone, shale and conglomerate; in fact, most of the rocks described by Irving as occurring in the Keweenaw of the United States.⁵² One variety of conglomerate, basal and made up chiefly of the underlying Laurentian rocks, has apparently not been found south or west of lake Superior, though not uncommon on the northeast shore. As a very full list of authorities on these rocks is given by Irving it will be unnecessary to refer to them in detail here. The northeast shore Keweenaw has been described more or less fully by Logan,⁵³ Dawson and Macfarlane and needs no lengthy account.

Following up the shore from Sault Ste. Marie, rocks of this age are first seen at Gros

Cap, where red quartz porphyry rises through the Laurentian, interesting from the fact that it has carried up in its eruption fragments of coarse quartzite, no doubt belonging to some Huronian bed beneath. Round

Localities of the Keweenaw on Lake Superior.

the point a patch of typical amygdaloid rests against the foot of the Laurentian mass; and the same rock occurs at three points on the east side of Batchawana bay. The area at the northeast of this bay seems to be considerable, a range of hills of amygdaloid running east and west for some distance. At one point a small patch of green amygdaloid is seen to form a breccia, ramifying among the granite blocks at the point of contact.

Next comes the large area of Mamainse, so fully described by various writers because of the copper mines located upon it. Amygdaloids occur once more on the north side of Pointe aux Mines, and connected with them a basal conglomerate or breccia containing large boulders of gneiss or granite forming the bottom of the series.

Beyond this for some distance no large stretches of Keweenaw are found, but that these rocks once occupied the region and probably still exist beneath the lake is shown by occasional patches of the basal conglomerate filling old chasins of the Laurentian. As their greenish cement is soft, the conglomerates are more readily acted on by waves than the Laurentian rocks around, and the Keweenaw shore line is being restored by the waters of the lake, the ancient boulders being set once more rolling after their long rest.

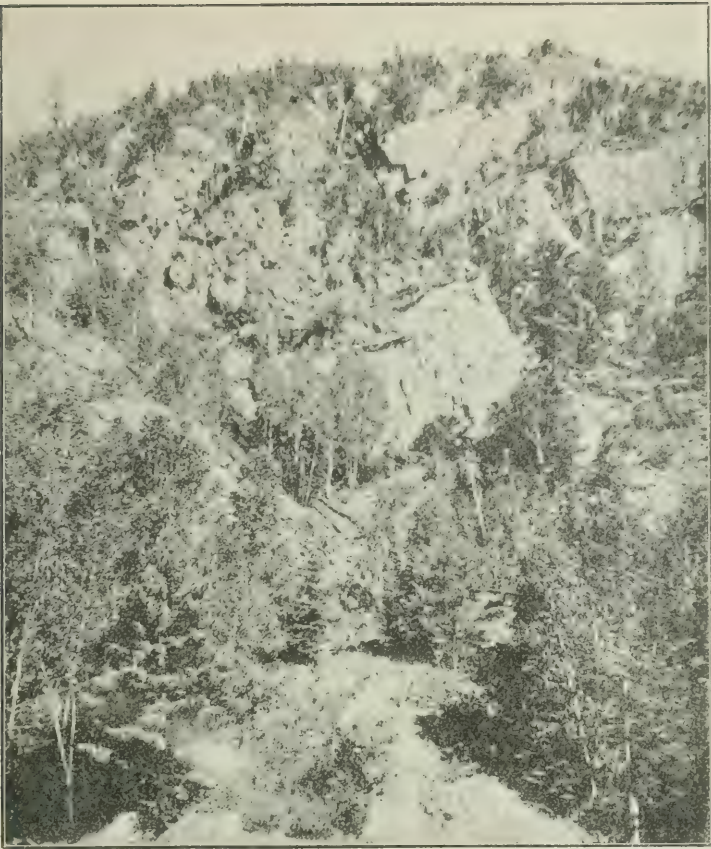
To the south of Gargantua there are curious red shaly rocks with numerous cavities almost like amygdaloidal openings, and at the extremity of the cape amygdaloids resting directly on gneiss without the usual basal conglomerate.

Beyond this, undoubted Keweenaw rocks were found only at two points, between Pilot harbor and Pucaswa, nearly north of Michipicoton island; and at Swallow river about 15 miles northwest; in both cases remnants of basal conglomerate preserved by having been deposited between Laurentian walls in narrow ravines. Each of them shows a brownish-purple ground mass more or less crowded with granite and less often diabase pebbles.

It is probable that many of the very numerous diabase dikes to be found all along this shore are really of Keweenaw age,

⁵²Copper Bearing Rocks of L. Sup., U. S. Geol. Sur., 1883.

⁵³Geol. Can., p. 67, etc., Logan; Can. Nat. and Geol., vol. II., 1857, p. 1-12, Dawson; Geol. Sur. Can., 1866, 115-148; Can. Nat. and Geol., 1866-8 (2), vol. III., pp. 177-202 and 241-257; and also 1879 (2), vol. IX., pp. 91-102, Macfarlane.



Cliff north of Pointe aux Mines, Lake Superior

- Willmott



Eroded Keweenaw Conglomerate, one mile north of Point Mamaine Lake Superior

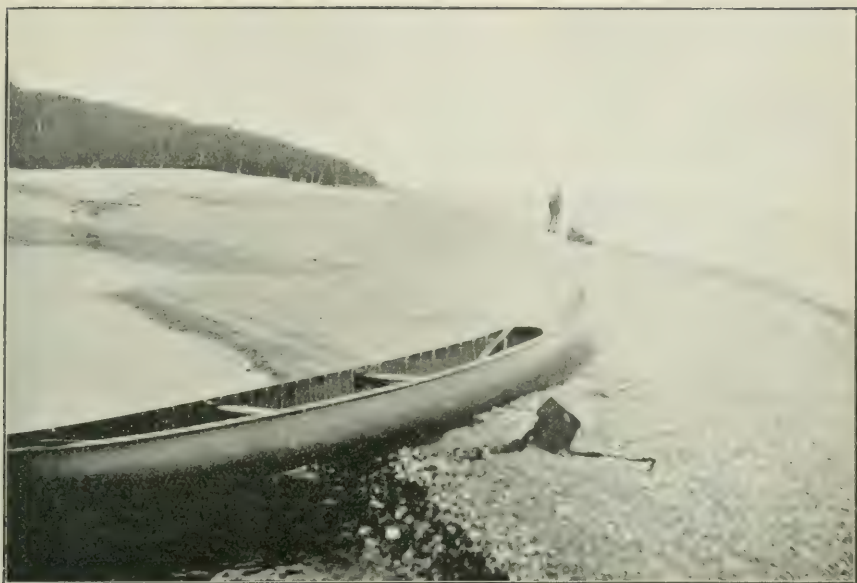
- Willmott



Remnant of a Dike north of Pointe aux Mines, Lake Superior, 15 ft. high Willmott



19 Boulder near shore, two miles north of Pointe aux Mines, Lake Superior. 1901. Willmott

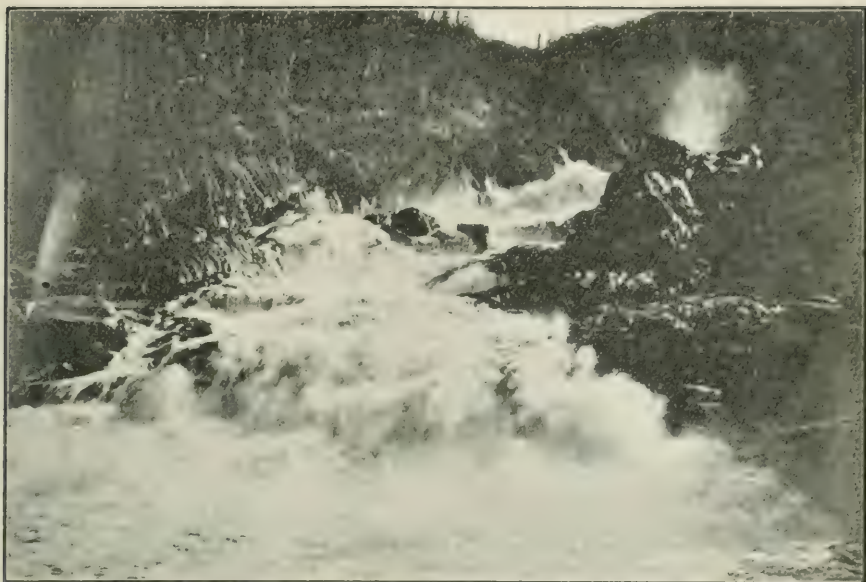


Gravel and Sand Bar at mouth of Dog River, Lake Superior. Length of Bar on lake side $\frac{1}{2}$ m., width at centre 140 ft. An old Channel lies along the base of the wooded hill in rear. — Willmott.



The Caribou, at mouth of Montreal River.

— Willmott.



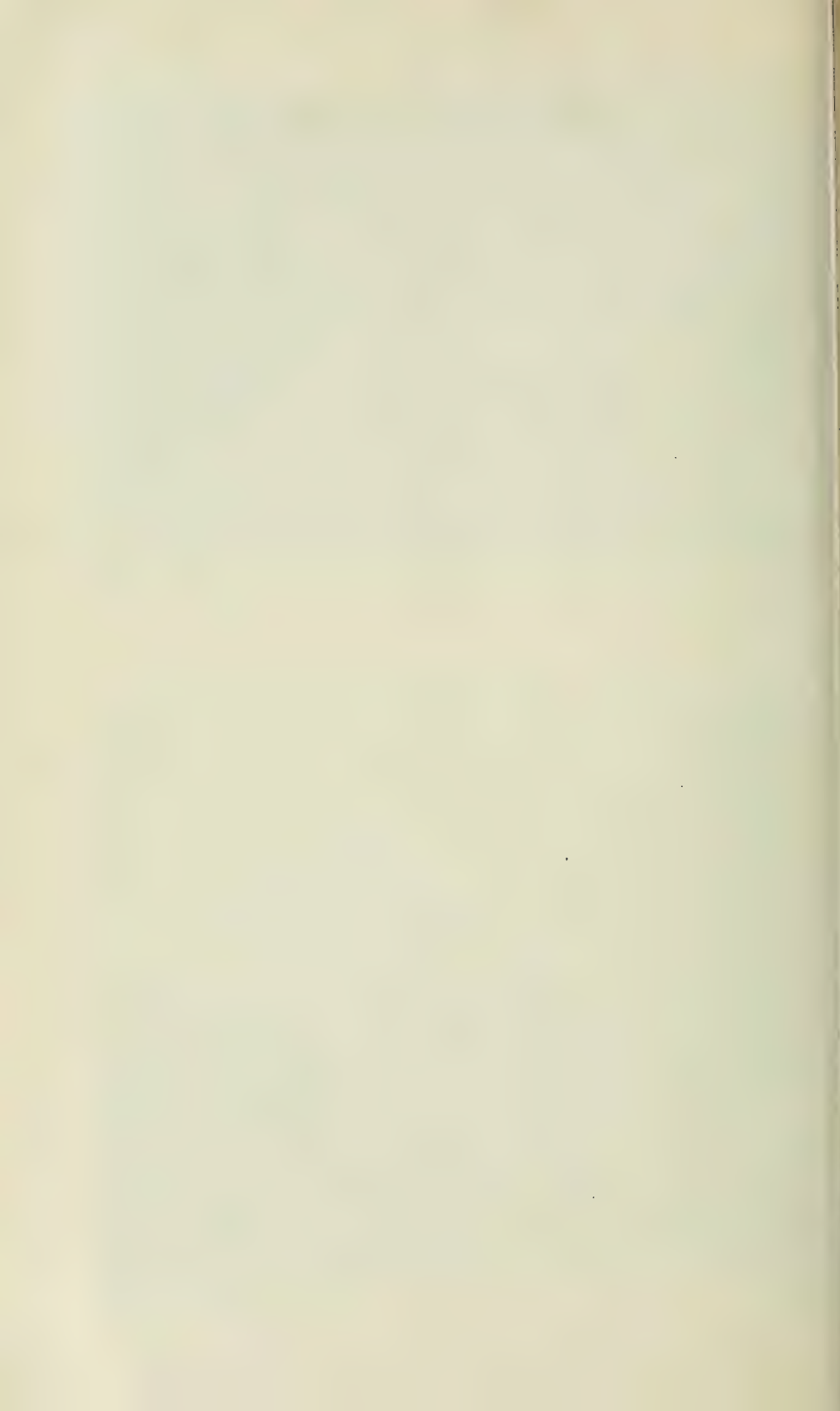
Denison Falls, two miles up Dog River, showing the lower part of the main Fall

—Willmott



12 An eroded Dike north of Soudan Harbor, Lake Superior, 200 yds. long, 25 feet wide, and 10 to 20 feet deep.

—Willmott.



though this is hard to prove. Some of them however are of greater age, since the dikes of the Keweenaw basal conglomerates rest upon Laurentian and diabase dike alike, and contain boulders of the latter.

The dikes of the region are distinctly of two kinds, one with pronounced columnar structure, the other without. It is probable that the columnar dikes are of Keweenaw origin and the others older.

The splendid series of basic and acid rocks of Michipicoton island have been described by Logan and Macfarlane; and thin sections of them have been studied by Irving, so that nothing need be said of them here.

Notes on Petrography.

During the summer numerous rocks of petrographic interest were collected, particularly eruptives, and the petrographic characters of the more important ones will be briefly described. Some of the eruptives form beds interstratified with the sedimentary rocks of the Huronian and of the Keweenaw series, having been contemporary lava flows, as proved in some cases by the presence of amygdaloidal layers. In other cases the rocks form large masses which have erupted through the Huronian sediments; and in many instances specimens have been collected from dikes, generally of later age than the Huronian.

Eruptives connected with the original Huronian region will be taken up first; then eruptives belonging to the Keweenaw; and finally eruptives associated with areas mapped as Huronian on the north shore of lake Superior.

Eruptives of the Original Huronian.

Only two undoubted sections of eruptives interbedded as contemporary lava flows in the series of Huronian clastics have been studied, both from near Thessalon where dark green diabase forms numerous beds separated by amygdaloidal layers. They are very fine grained, and appear to be connected with ash rocks and agglomerates of the same composition farther towards the east. The amygdules are sometimes large and scattered, at others small and crowded. The filling is usually

dark green serpentine, in large amygdules sometimes enclosed by a band of epidote. Chalcedony and calcite occur only sparingly. In thin sections the amygdules show as pale green areas, at times with concentric bands of radiating fibrous serpentine showing dichroism. With crossed nicols no double refraction is observed except in the radiating fibrous layers which show pale violet when not parallel to chief sections of the nicols. The rock as a whole is greatly weathered, but the tiny lath-shaped feldspars are still readily seen giving a characteristic ophitic structure. The only other minerals recognizable are magnetite, serpentine and a little green hornblende.

Eruptive masses both basic and acid are common in the original Huronian, and wherever examined by us appear to be of distinctly later age, showing eruptive contacts with quartzite, etc. Of the basic rocks two diabases may be referred to, the first the mass in which the well known copper-bearing veins of the Bruce Mines occur. This mass was looked on by Logan as being interbedded, but our observation of eruptive contacts near Bruce Mines indicates the contrary. The diabase at Bruce Mines is being quarried as road metal for use in Cleveland, Ohio, so that fresh specimens are easily secured.

The rock is dark green gray, of medium grain, with a distinctly ophitic structure. There are a few plagioclase phenocrysts of dull green color. Under the microscope the feldspars, which are quite fresh, show a complicated twinning zonal structure, and extinction angles suggesting labradorite. In spite of the rather basic felspar there is an appreciable amount of quartz present, partly as small blebs but mainly as micropegmatite radiating in delicate intergrowth with felspar from well formed crystals of the latter mineral. The augite is mainly weathered to dull green hornblende, and this with a little brown biotite and some magnetite form the rest of the rock.

A hill rising several hundred feet not far from the north end of Great Lake George consists also of diabase, but much more weathered. A thin section shows a larger amount of quartz with a coarser intergrowth as a rule.

A large area of rather dark red rock, coarse grained and syenitic looking, occurs between Thessalon and the Cheney copper mine near Mississauga river.

An Area of Grano-diorite. Under the microscope it proves to contain a considerable amount of quartz, having a rough intergrowth with felspar; orthoclase in small amounts, often having very long and slender micropertthitic inclusions; plagioclase with narrow twin lines and low extinction (oligoclase), quite often with long prismatic forms very well shaped. Dark brown highly dichroic hornblende and also pale green secondary hornblende occur in considerable amounts, and a little biotite and magnetite. The plagioclase felspar distinctly outweighs the orthoclase, though the rock has the look of a syenite or granite. It may perhaps be called grano-diorite.

Several narrow straight dikes cut the limestone band on Echo lake, standing up an inch or two above the surface, since they resist weathering better than the enclosing rock. Two of these dikes are only from one to five inches wide, but distinctly coarser grained in the middle, where also a few tiny fragments of jasper are enclosed in the black matrix. A thin section shows a dull grayish brown ground mass, with a few brightly polarizing needles which seem to be of augite, not of plagioclase, from their high double refraction. The ground mass was probably glass at first. There are white spots of some secondary mineral with quite high colors between crossed nicols, and a very few phenocrysts, one of olivine turned to serpentine, others of augite. The rock may be called a weathered picrite porphyrite.

A larger dike is 33 inches wide and shows a curious banded structure, at the edge very fine grained, then growing gradually coarser with white or honey-colored spots like amygdaloids. Then an inch of black fine grained rock followed by a few inches of amygdaloidal rock again, with a fine grained black strip in the middle. Beyond this the arrangement is reversed, giving a ribband-like look to the dike. It is probable that the fissure occupied by the dike has been opened several times, splitting down the only partially cooled middle and allowing a fresh flow of molten material. The only specimen

taken was from an amygdaloidal layer. Under the microscope one finds much augite, some of it in slender strips, a large amount of brown biotite in distinct phenocrysts, often with browner margins, and magnetite. The finer grained parts of the rock are vaguely doubly refracting and perhaps represent devitrified glass. No plagioclase could be found, nor anything looking like a decomposition product of it. The amygdules are filled with a dirty white mineral, feebly double refractive or not at all so, probably a zeolite. No olivine was distinguished, so that the rock may be named an amygdaloidal biotite pyroxenite. It may be however that the apparent amygdules are the result of the replacement of a former mineral, when the rock should be described as pseudamygdaloidal.

Keweenaw Eruptives.

A large proportion of the Keweenaw rocks at Mamainse and on Michipicoton island are basic eruptives, which have been poured out as lava sheets having many layers of amygdaloids between beds of diabase. Some of them are black glassy rocks, pitchstones; others rather coarse grained. Most of the basic eruptives so elaborately described and figured by Irving occur in our region, and a portion of his specimens came from Michipicoton.⁵⁴ Owing to the completeness of Irving's work not much time has been devoted to the basic eruptives, and only a very few will be referred to here.

A quite coarse grained diabase forming part of the country rock of the vein at the main shaft of the Sand Bay copper mine is of interest because of the peculiar arrangement of the radiating fibres of pale green serpentine filling certain spaces, probably pseudamygdaloids, between the other minerals. Some of these radiating masses are spherical and show a very distinct black cross in polarized light, but the arms of the cross are not straight. Each arm is a little bent near the centre, giving a form suggesting the "swastika" as figured by ethnologists. In other masses the concretion is not round but elliptical, when the arms of the cross are unequally spaced, having an X form.

⁵⁴ The Copper Bearing Rocks of Lake Superior U. S. Geol. Sur., 1883.

A variety of diabase or melaphyre like that figured by Irving⁵⁵ and described as consisting of large augite anhedral crowded with microlites or small laths of plagioclase, and separated from one another by more easily decomposed material, originally glass, is very common at Mamainse. The rock weathers rapidly in the interstitial parts, leaving the augites as fine gravel formed of rounded fragments of the size of peas or beans. His description applies to our rocks with the one exception that no olivine has been observed in the latter. The interspaces between the augites, which are quite fresh, are filled with brown iron oxide and serpentine containing laths of plagioclase, but no outlines nor remnants of olivine, so that the rock should be called diabase, not melaphyre.

The glassy variety of the Keweenaw basic eruptives has much the look of Lydian stone, and is very opaque, so that sections are with difficulty ground thin enough to be transparent. The rock consists essentially of fresh brown glass crowded with slender microlites of plagioclase, and also of augite with many small grains of magnetite. A few larger crystals of plagioclase are to be found, generally having inclusions of glass. The rock closely resembles in thin sections a melaphyre from Goldspitz in Bohemia. It is perhaps better called a basic pitchstone.

The amygdaloids of this age are usually very badly weathered, so that sections were made of only a few. Those examined have the character of fine grained diabase, generally somewhat porphyritic. One contains numerous skeletons of iron oxide having the form of olivine crystals, though no olivine remains. This may be called an olivine diabase. The amygdules, so far as studied, contain calcite, chalcedony, pale green serpentine and a grayish, scarcely doubly refractive mineral, probably a zeolite. Native copper occurs in the amygdules, though rarely.

The acid eruptives among the Keweenaw rocks include a series of flesh red or dark red porphyries or felsites.

The fine promontory of Gros Cap consists mainly of dark red quartz porphyry with many bright red felspar phen-

ocrysts and a few blebs of quartz in a compact ground. Thin sections show that the felspars are largely plagioclase, though sometimes unstriated. Their advanced stage of weathering, rendering them turbid and clouded with particles of hematite, makes it doubtful in many cases which felspar is present. The ground mass is made up almost wholly of an intergrowth of quartz and felspar, chiefly unstriated so far as can be determined. This intergrowth is of a peculiar character. Sometimes a quartz area is filled with separate small felspars not always oriented alike, forming a poikilitic structure. At others the quartz forms slender ramifications suggesting frost work, in a mass of felspar that seems to be continuous. Larger quartz portions may branch off into this structure. Some parts of the intergrowth have the appearance of micropegmatite, and perhaps the whole of it might be brought under that designation. The rock in that case may be called a micropegmatite porphyry. Irving describes and figures somewhat similar rocks from Michigan,⁵⁶ and regards the quartz as secondary, saturating the rocks and sending projections into the felspars. As practically the whole of the rock consists of this intergrowth, and from $\frac{1}{3}$ to $\frac{1}{2}$ consists of quartz, this theory demands too much. It is very improbable that $\frac{1}{3}$ of the weight of the rock could be introduced from without in the form of quartz and so uniformly disseminated as we find it. The more likely explanation is that the magma, in which a few crystals of felspar and still fewer blebs of quartz floated, having much more than the right proportion of silica to form felspar, consolidated into micropegmatite. That there are secondary micropegmatites is probable, but in this case it is more reasonable to look on this widespread intergrowth as primary.

Handsome specimens of quartz porphyry as well as quartzless porphyry are found on Michipicoton island, and several Porphyries and Felsites have been studied. They show a similar intergrowth of quartz and felspar in the ground mass, though much less elaborate and striking. The porphyritic felspars observed are mainly striated and have the

Acid
Eruptives of
the Series.

⁵⁵ Copper Bearing Rocks of Lake Superior, pl. IX.

⁵⁶ Copper Bearing Rocks of Lake Superior, p. 112, etc.

characters of oligoclase. Flesh colored felsites occur in considerable quantities at Mamainse, but the specimens obtained do not differ materially from those collected by Mr. Blue at the same locality in 1893 and described in his report for that year.⁵⁷

Dike Rocks near Heron Bay.

The Heron Bay schist conglomerates, which may be considered of Keewatin age, are penetrated by a number of dikes well displayed in the railway cuttings west of the station. Thin sections have been made of a number of these, and a few of the more interesting will be described. A dike several feet wide of very dark gray diabase porphyrite is of interest as showing very well the transition from the edge, which is exceedingly fine grained with some devitrified glass, to the coarser grained diabase in the center. Large and fresh tabular plagioclases form phenocrysts in each and a few porphyritic augite crystals occur in the marginal part of the rock.

Besides the diabase dikes there are several varieties of acid dike rocks, some of an interesting kind, which will be briefly described, though some points in connection with them are not yet fully worked out.

One large dike is of grayish flesh-colored quartzless porphyry, having a microgranitic ground consisting of quartz, orthoclase, plagioclase and muscovite, and large very well formed crystals of felspar, mainly plagioclase, though a few unstriated crystals, sometimes Carlsbad twins, occur. The plagioclases have extinction angles indicating andesine to labradorite.

Some rather flat-lying bright red dikes observed near the head of Heron bay a half mile or less from the railway prove to have a curious structure. Practically the whole rock is made up of radiating masses of reddish feathery crystals, probably of felspar, giving an imperfect black cross with polarized light. The felspar is much weathered and gives only faint gray polarizing colors when thin enough to be transparent. No quartz was observed either as micropegmatitic intergrowths or as separate blebs. A small amount of more transparent material, calcite

and serpentine, so far as determinable, lies between the roughly spherical felspar masses.

A dark brownish red dike, well displayed at a cutting near mile 804, west of Heron Bay

A new Anal-station, shows less perfect radiating crite rock.

structures, probably of felspar, faintly polarizing and crowded with particles of red iron oxide. The rays are few in number, not feathery, and have a low angle of extinction from edges of the narrow lath-shaped crystals, in many cases not distinguishable from parallel extinction. With an immersion lens some of these felspar laths are resolved into strips having slightly different angles of extinction, as if oligoclase. In the general ground there are some wider plates of similar felspar, not observed to be striated. There are also imperfectly radiating groups of a green mineral, having a distinct dichroism, green and yellowish green, and bright polarizing colors. The mineral was at first taken for hornblende, but most of the prisms have parallel extinction, or only a very low angle of extinction. The latter character suggests that the mineral is ægerine, but the crystals are too minute to be separated for special examination.

The most interesting feature of the rock is the large amount of glassy ground mass enclosing the radiating structures. As this appears to be quite isotropic it was at first held to be glass. It is free from the brownish particles of many volcanic glasses, but resembles some acid pitchstones. However under high powers this basis proves to have delicate but well marked cleavages, often crossing at right angles and suggesting a mineral of the isometric system. In a few parts an exceedingly faint reaction is given with polarized light, much fainter than that of lencite; but in most parts this was not observed, and where found it may result from strain. The refractive index of the mineral is lower than that of most felspars. It is possibly analcite, though the general characters of the rock are very different from those of analcite rocks hitherto described, the latter being black and basaltic looking.⁵⁸ Some greenish spots in the rock prove in thin

⁵⁸ Pirsson, The Analcite Group of Rocks, Jour. Geol., vol. iv., No. 6, p. 679, etc.; and Whitman Cross, vol. v., No. 7, p. 684, etc.

⁵⁷ Bur. Mines, 1893, pp. 71 and 72.

sections to consist mainly of vaguely radiating masses of felspar, apparently not striated, with a smaller amount of dolomite. None of the isotropic mineral is seen in these areas.

The complete analysis given below was made by Mr. H. W. Charlton, his results being put in column I. In column

Comparative Analysis. II an analysis by Dr. Mann of cancrinite-eggyrite-syenite from Siksjö-Berg in Dalarna⁵⁹ is given because of its rather close resemblance to No. I; and in column III an analysis of analcite-basalt from the Basin, Colorado, by W. F. Hillebrand.⁶⁰

	I	II	III
SiO ₂	52.73	51.04	45.59
TiO ₂		.29	1.32
ZrO ₂			.03
Al ₂ O ₃	20.05	20.47	12.98
Fe ₂ O ₃	3.43	1.89	4.97
FeO	.99	2.19	4.70
MnO			.14
CaO	3.35	2.62	11.09
SrO			.12
BaO	.11		.13
MgO	.17	.97	8.36
K ₂ O	4.77	3.52	1.04
Na ₂ O	7.94	11.62	4.53
H ₂ O (at 100°)	.69	5.85	.51
H ₂ O (at red heat)	4.85		3.40
P ₂ O ₅	trace	.27	.91
Cl			.05
CO ₂	.93	.62	
	100.01	101.35	99.87
Spec. Grav.	2.466	2.46	

A little more than 46 per cent. of the rock remains unaccounted for by the partial analysis; and if we suppose the whole of the potash to belong to orthoclase and the unused portion of iron oxide (1.40 per cent.) to belong to eggyrite, we have left silica, alumina, lime, and soda nearly in the proportions required for labradorite (Ab. 2 : An. 3) though the lime and soda are about one-third in excess of the amount required, the excess being less than 1 per cent. however.

Summing up the results arrived at, the minerals forming the rock have the following percentages :

Analcite	47.00
Orthoclase	28.24
Labradorite	13.00
Eggyrite	4.04
Limmonite	3.59
Calcite	1.96
	97.83

In this computation moisture removed at 100°, unimportant percentages of magnesium and barium oxides, etc., amounting in all to 1.47 per cent., have been neglected.

⁵⁹Neus Jahrbuch für Mineralogie, 1884, II, p. 193; as quoted by Zickel, Lehrbuch der Petrographie, Band II, p. 410.

The composition of the rock as shown by the analysis differs widely from that of analcite-basalt, as may be seen from a comparison of columns I and III, the latter being more basic, containing less alumina and alkalies, and far more lime and magnesia. It corresponds fairly well however to the composition of nepheline syenite, the only important difference being in the amount of water. The syenite from Dalarna, whose analysis is given in column II of the table, having its nepheline weathered to a hydrous mineral, resembles this rock closely in composition, the only important difference being the larger percentage of soda. In their unusually low specific gravity, 2.46, the two rocks are alike.

One naturally expects to find the dike containing the rock above described in connection with some boss of nepheline syenite; but the slight examination hitherto made of the region by Dr. Bell and myself has not disclosed any area of that rock.

If the analcite rock of Heron Bay had a granular texture, it would appropriately be named analcite-syenite, after the analogy of nepheline-syenite; but its peculiar structure of spherical groups of orthoclase embedded in a ground of analcite containing radiating bundles of plagioclase laths and eggyrite needles sets it quite apart from the syenites. It will probably be wise to give it a separate name, and Heronite, from the name of the locality where it occurs, is suggested as suitable.

Heronite may be defined as a dike rock consisting essentially of analcite, orthoclase, plagioclase and eggyrite, the analcite having the character of a base in which the other minerals form radiating groups of crystals. The analcite clearly represents the magma left after the crystallization of the embedded minerals; and it is evident that it can be formed only from a magma highly charged with water, and therefore under pressure. It is equally evident that Heronite, like other analcite rocks, cannot be an effusive, since under those circumstances the water would

⁶⁰Whitman Cross, an Analcite-Basalt from Colorado. Jour. Geol., vol. V, No. 7, 1897, p. 689.

escape;⁶¹ and that its nearest relatives among effusive as well as plutonic rocks are to be found in the group containing nepheline.

Associated with the last rock is a reddish brown rock thickly filled with greenish black spots, looking somewhat like amygdules. It is hard to get thin enough sections for microscope work, and the general mass of the rock is too far weathered to settle anything positively, particles of a carbonate being mixed

with brown iron oxide. The spots looking like amygdules have deep red rims of iron oxide, and consist within of dolomite, chlorite and a few portions of felspar like that mentioned in the previous rock. It is probable that this rock represents a more completely weathered state of the one mentioned before; and that the apparent amygdules are only pseudamygdules formed from the greenish concretionary spots of the previous rock.

⁶¹ Cf. Pirsson, *Analcite Group of Igneous Rocks*, Jour. Geol. vol. IV. No. 6, pp. 686-688.

THE NIPISSING-ALGOMA BOUNDARY.

By William Arthur Parks.

Introduction.

EARLY in May, 1898, I received instructions from Mr. Archibald Blue, Director of the Bureau of Mines, to accompany Mr. Alexander Niven, who was despatched to extend the Nipissing-Algoma boundary line to Moose river. My instructions were to examine and report on the geological features of the district, its timber resources, agricultural possibilities and all matters of an economic nature. In order to enable me to cover as great an extent of territory as possible I was provided with a canoe, and I was given the assistance of Mr. W. E. H. Carter of the School of Science, who proved quite efficient.

Basin of Nighthawk Lake.

The whole party, 20 in number, left Haileybury at the head of lake Temiscaming on May 21. On May 23 we crossed a seven-mile portage to the Montreal river, whence a route was followed to Nighthawk lake, the terminal point of the old line. The first 120 miles had been run by Mr. Niven in 1896, and it extended a short distance north of Nighthawk lake. As Mr. Burwash accompanied Mr. Niven on that occasion, an account of this region may be found in his report. Two weeks were spent in reaching this point, via the Montreal river, lake Matachewan and a chain of small lakes and Nighthawk river to the southern point of Nighthawk lake.

Tributaries of the Lake.

Nighthawk river below the portage is a sluggish stream of from one to two chains in width, expanding in places into marshes of considerable extent. Its shores are low and clad with scrub spruce and tamarac, passing into poplar near the lake. No exposures are seen on the river,

but a massive green diorite crops out on the lake shore to the west of its mouth. This rock shows distinct glacial striae s. 15° E. and is overlaid by eight to ten feet of stratified clay.

From this point to the mouth of the Redstone river the lake shore presents, in places, bluffs of stratified clay rising as high as 40 or 50 feet. Its continuity however is interrupted by numerous deposits of fine sand, which appear to occupy denuded valleys in the clay. Occasional outcrops of rocks are seen on this western shore, consisting of more or less altered diorites interstratified with fine grained quartzose schists carrying pyrite. One and a half miles north of the mouth of the Redstone coarse hornblende and mica diorites crop out on the shore. Near this point also occur fine grained gray hornblende schists with veinlets of quartz. Three miles farther north are seen rather hard hydromica schists with veinlets of quartz and showing a pronounced schistosity N. 30° E.

About seven miles north of the Redstone river the Porcupine enters from the west, above which stream a long point stretches into the lake, extended by an island. On the north side of this island is a fine grained massive diorite, while to the south occurs a typical chloritoid schist, striking N. 70° W. In addition to these rocks a fine grained crushed granite with pyrite occurs on the small island off the mouth of the Redstone river. From this river to the outlet at the northern extremity of the lake, with the exception of the above mentioned exposures, the shores are clay. High banks of the same material occur directly across the lake, forming the most conspicuous point in the landscape.

Nighthawk lake is very shallow, according to Mr. McLeod, who has spent several years in the region, not exceeding 12 feet in depth. Its waters are very muddy, and had on June 6

a temperature of 60°. Extensive marshes occupy many places on the shore line, but otherwise its banks are green, being timbered with small spruce, poplar, tamarac and birch.

The Redstone river enters Nighthawk lake not far from the 123rd post on the boundary.

Redstone River. This stream is of brown water, with an easy current as far up as the 'crossing' of the line (two miles); beyond it becomes rapid, flowing over a bed of boulders. No exposures were observed either on the river or on the line in its vicinity.

Another stream entering the lake from the west is the Porcupine, which has its source in a lake of the same name, lying five or six miles west of Nighthawk lake. The total length of this stream is 30 miles; it is therefore found more convenient to reach Porcupine lake by a portage of five miles, which is broken in the middle by a small lake. The first stretch of this portage starts from the south bank of a small creek entering the Porcupine two miles up. The portage is about two and a half miles long and maintains a general direction of S. 20° W. over level clay soil, very swampy in places and timbered with poplar, spruce and tamarac of moderate size only. About two-thirds of the way across is an exposure of diorite followed by fine grained quartzose schist, weathering into white patches owing to decomposing felspar crystals. The lake at the end of this portage is known as Red Willow lake, from the fact that that shrub is abundant on its shores. It has clay banks and muddy water, which is discharged at the north side through a small stream showing evidence of the activity of beaver. A ridge of dioritic schist thirty feet high constricts the lake towards its eastern end.

The head of the next portage is rather difficult to locate, but once found the trail is easily followed. It holds a general direction a little south of west, and at first is dry and well timbered with spruce. The greater part of its length however traverses a tamarac swamp, very wet and difficult to travel. The end is on a small creek entering the Porcupine from the southeast. Above the portage this stream is very tortuous, and filled with driftwood derived from a burnt

area a short distance to the southeast. Ten chains below the portage we enter the Porcupine, and two miles down pass into the lake.

Porcupine lake is two and a half miles long and a half to three-quarters of a mile wide.

Porcupine Lake. Its shore line presents several exposures of rock; on the north side occur outcrops of a soft soapstone-like rock, with crystals of magnetite and veinlets of chrysotile. Under the microscope this rock appears to be made up of indistinct fibres of this mineral mixed with quartz. It is evidently a much altered example of the basic eruptive series. A creek of a very tortuous course flows in from the southeast; on it occur exposures of a gray to white quartz schist, weathering quite white with streaks of quartz and pyrite. Considerable birch and pitch pine are found on this stream. A rocky point of some elevation is seen on the south side of the lake, consisting of altered diabase and gray schist, with asbestiform partings and veinlets of quartz. An overland trip south from this point shows that the rock disappears as soon as the water is left, the country being low and wet, with tamarac, spruce, poplar and cedar.¹ This latter tree obtains a diameter of 14 to 20 inches in this vicinity, and appears to be plentiful. The temperature of the water in these swamps was 36°, while in Porcupine lake it was 58°.

On leaving the lake Porcupine river flows through a marsh half a mile in width and bends northward for 15 miles. It then turns east and south, and crosses the line at 130 miles and 66 ch. It is navigable throughout, but several short portages are required in the upper stretches. The following outcrops of rock occur on this river:

Three miles below the line, a much altered diabase with asbestiform hornblende and green hornblende schist.

Four miles below the line, a very fine grained schist, almost pure silica.

Five miles below the line, the rock becomes very ferruginous. Just beyond, the river forms small rapids over fine quartz schist, hydromica-like in places.

One and a half miles from Nighthawk lake there occurs dark gray slate-like schist, weathering white with bands of quartzite. Strike S. 60° E. Dip 30° from vertical.

¹ That this low land gives place to rocky ridges farther south has since been ascertained. An account of these outcrops will appear in a future report.

A short distance west of the 29th mile post is an outcrop of diorite, associated with schists containing seams of quartz, which gave on assay a minute trace of gold. The only exposures seen on the line between Redstone and Porcupine rivers were two bands of schist near the 126th post. With this exception the line crosses a level clay district thickly wooded with spruce, poplar, tamarac and a little birch, but none of any considerable size. The same features are dominant along the Porcupine river and along Nighthawk lake. Large areas in this region would make excellent farm land, particularly near the lakes and rivers. The country inland is much wetter, and I am inclined to believe increasing in this respect farther to the west.

Frederick House Lake and River.

The river from Nighthawk lake flows almost due north a distance of six or seven miles to Frederick House or Hollow Sand lake. It is about two chains wide and is unbroken by any rapid. No outcrop occurs on its banks or on the west shore of Frederick House lake until we near the outlet at the northern end. Here are exposures of diorite and diorite schist with quartzite. The eastern shore is less well protected by clay and sand, and outcrops are more numerous, the following series being presented from north to south :

One and a half miles from the north end, fine-grained porphyrite with pyrite, striking southeast and dipping 30 degrees from the vertical.

Two and a half miles down are fine dark-gray schists with streaks of pyrite and a coarse green rock, apparently highly felspathic. This dark schist shows a banded spheroidal weathering and seems to consist of nuclei of a jasper-like variety enclosed in the darker bands. This passes into the ordinary gray and white schists. That these schists are, at least in part, of volcanic origin is well shown at this point.

Frederick House Lake.

Frederick House lake is of much the same character as Nighthawk, but contains fewer islands ; like the latter lake it is very shallow, and its waters have the same turbid appearance. The Indian name is Wanatangua, meaning Hollow Sand. I am inclined to think that this name is derived from the fact that the clay shores are covered in places by a layer of sand which gives way on being

pressed by the foot. The southern and eastern shores also are overlaid by extensive deposits of clay. These are interrupted by areas of sand both to the north and east, where gravels and glacial accumulations begin to occur.

This lake is subject to violent storms from the east and southeast, the evidence of which is seen in the fallen trees and scarped clay banks on the western shore.

The country inland from Frederick House lake was examined by means of a series of portages running west from a point four miles north of the mouth of the river from Nighthawk lake. They join a succession of small lakes, for the most part of beautifully clear water, notably the second, which is known as Clearwater lake. These portages all traverse high, sandy and burnt hills, consisting of very coarse sand with Huronian and Laurentian boulders. Some deep depressions resembling kettle holes are seen on the third portage. By level, Clearwater lake is 60 feet above Hollow Sand, while the intermediate pond is only five feet up.

The last lake of this chain is Ice Chisel lake, which has sand for its eastern and northern boundaries but falls into clay flats to the south and west. For a mile and a half east of the lower bulb of this lake the country is sand with some pitchpine, broken in places by muskegs. A two and a half mile trip from this lake to the west reached the line at the 135th post. This trail crosses a rough and wet country of tamarac and spruce, broken by a single ridge of burnt sand 2½ chains inland. The line traverses a similar country, alternating from half dry clay land to very wet muskeg. West from the 136th post the swamp increases in wetness and finally becomes impassable ; a typical bog.

Frederick House River.

The water of Frederick House lake passes out at the north end by a river of the same name. It is two or three chains wide at the head, with an easy current. About a mile and a half down, it bifurcates around an island 40 chains in length and continues a little west of north to the first falls, about seven miles down. A

Descent of
the River.

barrier of rock crosses here N. 10° E., causing a succession of cascades with a total descent of 46 feet. An island divides the river, and, in all, it may be said that there are three tiers of three cascades each, with a total width of five chains. A rather steep portage of three chains on the east enables us to pass the obstruction. The rock at this point is a much altered porphyrite weathering in white patches, and a fine gray homogeneous siliceous schist. Below the falls dioritic and basaltic rocks occur, of which a much altered example shows decomposed felspar crystals surrounded by chlorite. On the east side this ridge follows the river up stream for a half mile, when it becomes less pronounced.

Northeast from here the land gradually falls to low swampy flats, with almost impassable windfalls. Southwest a ridge occurs on the shore, followed by a valley and a second ridge of clay soil well timbered with poplar, spruce, birch and balsam. This is succeeded by a muskeg with scrub spruce and tamarac.

Below the falls the river holds a course a little west of north, receiving a tributary two miles down. This stream is ten feet wide and flows from a lake a short distance to the west. A trail from the river to the north-west leads past the lower end of this lake to another beyond, crossing the line at 47 chains on the 146th mile. This latter lake is doubtless in connection with others to the west. On its shores occur some beautiful sulphur springs. In this district fair sized poplar and spruce are abundant and the land is quite dry. As may be seen on the map, several other small lakes are scattered over this region, all of which are connected by trails giving evidence of their use as hunting grounds. From signs observed, otter, fisher and beaver must be abundant in this region.

Below the above mentioned creek the river turns to the east of north, until its navigability is interrupted by three bad rapids at a distance of four miles from the falls. The first of these is passed by a portage of a chain on the west side. The fall in this rapid is five and a half feet over a rock composed almost exclusively of serpentine impregnated with much magnetite. The second portage

of a half chain is also on the west side of a western division of the river, around an island. The fall is only two feet, but it is much too rough to be run. Five chains below is the third rapid of 30 chains, with a fall of 14½ feet. The portage here is also on the west side and is somewhat hilly. The rock at all these portages is the same as that described at the falls. The direction of the river is about north, but it is hard to determine as a compass is almost useless owing to the presence of so much magnetite in the rock.

Below these rapids rock outcrops are more common than on the upper river. A ridge of white weathering fine-grained schist causes a small ripple about 50 chains down. This is easily run as the fall is only one foot, but small canoes can make a lift-out over the rock on the easterly shore. Below this ripple there is an outcrop of dark highly hornblende diorite on a small island. Two small tributaries enter from the west, and a little lower a considerable creek of 20 feet from the east. This was followed southeast for a mile, but was found to be jammed with driftwood. Besides small streams, a large creek enters from the west two miles below this one. The water of this creek is very brown and dirty, while its banks show numerous otter slides. It also is choked by debris 60 chains up. A mile below this stream the line crosses at the 157th mile post. Near here a tributary of one chain enters from the east. It has clay banks with evidence of high water two feet above the ordinary level. The river continues a little west of north for four miles more, when it is again broken by a long rapid over coarse gray mica schist with garnets, passing into granite, and beyond into Laurentian gneiss.

This evidently represents the Laurentian contact and the end of the Huronian belt thus far traversed. The probable direction of the contact is N. 60° W. as the gneiss shows a general schistosity in this direction. From this point to the mouth of the river, a distance of 25 miles, gneiss is the only rock observed. The first ten chains of this rapid at the contact is easily run to a portage of 15 chains on the east side. Below this rapid is three miles of swift water to another rapid.

The Huronian-Laurentian contact.

The next seven or eight miles of river is almost continuous rapids, but can easily be run in fair sized canoes, excepting the point marked "chute" on the map where a portage on the east side over the rock is necessary to effect a passage. The river is very narrow here and the fall about ten feet over gneiss and gray mica schist. Trips at this point proved the existence of fair sized spruce for a half-mile inland. Twenty chains lower a rapid of 50 chains may be run down by keeping in the middle, or ascended by hugging the shore and poling. Another 20 chains brings us to a small ripple easily run in any canoe. In the next four miles there are several small islands, while the current is smooth and easy to a fall of three feet, broken in the middle by an island. The easterly side can be run with care, and it may be ascended by passing a line on the island. A few outcrops of gneiss and mica schist occur at this point. A small creek enters over a bed of boulders below this rapid, as also do several others. The river maintains a direction a little west of north with an easy current for five miles, when it passes into the Abitibi river at the big bend. At its mouth the Frederick House river has a width of three or four chains.

Frederick House Lake to Abitibi River.

The description now turns back from Frederick House river to the lake at its source. East of Frederick House lake and in connection by a narrow pass is a lake of about two miles in length known to the Indians as Quaquaquitchwanook or "The-lake-whose-water-runs-both-ways." The barrier separating the two lakes is composed of glacial accumulations and coarse sand. The shores of the smaller lake are of sand, covered with good spruce and poplar and a few red and white pine. The water of this lake is much clearer than that of Hollow Sand, and fish are more plentiful. It seems to be the fishing ground for the Indians of the region, as many drying places were noticed on its shores.

A small creek enters from the southeast, a short distance up which is the head of portage leading s. 30° e. to a clear lake with highly calcareous water and having its shores

composed entirely of sand. From this lake a portage leads southeast for about two miles over a level sand upland with small pitch pine to a second lake about one-half mile long. South through this lake brings us to another portage of two miles over similar country, but with the pitch pine in part replaced by small spruce. This portage constitutes the height of land separating the waters of Frederick House river from those of the Abitibi. The route then crosses a small pond of 15 chains which receives some beautiful springs of ice cold water. Leaving this lake the trail turns northeast and traverses 60 chains of heavy poplar and spruce timber, then passes into a burnt area for about the same distance. Beyond this the trail makes an abrupt descent of about 60 feet, and passes through 60 chains of low, very wet spruce swamp, extremely difficult to portage over, ending in a small pond of 15 chains. Besides the lakes mentioned there are in this sand area numerous sheets of water of small size. A creek which the route follows flows out of the southeast corner of the last mentioned lake; it is very tortuous and narrow in places, having however a general width of 10 or 15 feet, and a depth of five feet. This stream traverses a low-lying tract, in places very swampy. The river bed itself is almost choked at intervals by a dense growth of alder and other marsh shrubs. In a straight line the distance to its mouth is three miles, while its total length is eight or ten. Through a large marsh this river enters an open lake two miles in length by one in width, with brown water of no considerable depth. The shores are low and swampy for the most part, but a point on the east side contains many boulders of Laurentian origin imbedded in a sandy clay matrix. The river out of this lake rises in the northeast angle; it is 30 feet wide and flows southeast for a short distance, when it turns north and maintains that direction with uninterrupted navigation for 10 miles. Throughout this stretch the shores are low and somewhat marshy, with ash, poplar, tamarac and spruce in clay soil. Farther down, the river is badly choked with drift-wood, in many places, making the navigation very difficult. About 12 miles down occurs

a small rapid over Huronian schists, the first outcrop on this river. A mile down is another rapid requiring a portage of 10 chains on the west side; at this point is an outcrop of fine greenish quartzose schist. In the course of the next mile are two small rapids which can be run; the lower however is provided with a portage on the east side. We now come to a series of small rapids extending for two and a half miles in the following way:

Rapids. Run, or portage on the east side.

One-quarter mile of open water.

Rapids. Run; a poor portage exists.

One-half mile of open water.

Rapids. Run.

One-half mile of open water.

Long rough rapid with chute at end; portage on west side. Rock, a hornblende microcline granite.

One quarter mile of open water.

Last rapid. Falls; portage of three chains to west.

There is a log jam of a permanent nature provided with a portage on the west, a short distance below the last rapid. From this point one and a half miles in a northeast direction brings us to the mouth of the stream in the Black river, which joins the Abitibi a few chains lower.

The Black river near its mouth has a width of three chains, with dirty brown water. Up

Huronian
Schists on
the Black
River.

stream we travelled in a direction a little east of south for 13 miles

without interruption. On this

stretch there are several exposures of fine Huronian schists and diorites with pyrite. Two considerable creeks enter as shown on the map, but are not at all navigable. Sandy clay soil predominates, clothed with the characteristic spruce and poplar. A large, recently burnt tract, with trees still standing, is cut by the river for six miles, but terminates before the first rapid is reached. The river at this point falls 12 feet over a dike of massive diorite striking northwest.

A good portage of two chains affords a means of passing on the east side. A mile farther up is a small rapid over a ridge of diorite schist striking N. 35° W. The fall is only about six inches. Five chains above this ripple is an exposure of fine gray to black schist with pyrite interstratified with diorite, the whole showing rhomboidal jointing. Ten chains above this exposure another rapid occurs with a portage of five chains on the

eastern side. The hill here rises to a height of 30 feet and presents exposures of schists and diorites at both ends of the rapid, while its central part is occupied by a boss of hornblende granite. On the opposite side of the river is an outcrop of a dark rock, with round white spots of one-quarter inch diameter, exhibiting fluidal structure in the magma. It is probably an amygdaloid, but the specimen brought is too much altered for exact determination. Here also occurs a rock which is probably a much altered porphyry.

Beyond this point rapids become more numerous, there being, ere in the next four miles. The first two require no portage, but the last is a fall of eight feet over diorite and is passed by an eight-chain portage on the east side. About two miles more brings us to a fall of 15 feet, with a portage of three chains on the west side. The water here is forced through a narrow gorge, in schistose rocks splashed with quartz and alternating with diorite belts. The land runs up to an elevation of 50 feet on both sides, with clay at the top; inland, however, it soon falls into muskeg.

After passing the falls the river becomes almost continuous rapids and I did not consider it advisable to follow it farther. Indians however go through this way to the head waters of the Rivière Blanche, and thence to lake Temiscaming. I was also informed that a portage leaves this river somewhere near the first falls and connects with a route to the Matachewan waters.

Among the small rapids at the head of the stream were found exposures of pyroclastics with three inch inclusions, also dark schists with diorite and splashes of quartz, associated with a little hydromica.

While camped on this river on July 1 a heavy thunder storm following a hot day raised the water two feet in one night. W. S. Ritchie, who had camped the same night on the small island below Iroquois falls on the Abitibi, found his canoes washed away in the morning, although they were six feet above the water line at night.

An expedition east from the highest point reached on the river revealed the existence of a hill of diorite fully 100 feet high. Clay

soil prevails beyond the summit, the country gradually falling. No muskeg was encountered in a trip of two miles. The timber is fair, but has been much destroyed by hurricanes.

West from the same point there is a hill of 50 feet, sinking rapidly into muskeg and alternating with clay flat.

Abitibi River.

The Black river enters the Abitibi at a point where the latter turns abruptly to the north with a width of three chains.

The River below the Big Bend. I encountered considerable current from the junction to the Two Portages, a distance of five miles upstream in a northeast direction. Here are two hard rapids 100 yards apart with portages of three chains, both on the east side. The lower fall is in three lateral cascades over a weathered diabase with pyrite, the descent being about nine and a half feet. The upper over the same rock falls only six feet. Glacial striae are well marked at this point with a direction s. 15° e.

From the Two Portages to Iroquois falls, a distance of ten miles, only one exposure of dark schist is observable. The banks of clay soil are uniformly well wooded throughout this stretch. Iroquois falls is the most important vertical drop on the river. The difference in level between the two ends of the portage is 25 feet, but the actual falls is somewhat less. The plunge takes place over a barrier of dark gray weathered diabase 10 chains long, running in a direction about north and south. It is broken into three lateral cascades by two small islands; while a third directly below the falls affords an excellent point of view for a very impressive scene.

For six miles the river continues between clay banks with a fair current, when it is again interrupted by a constriction of red gneissoid granite causing the speed to increase. Two miles farther we enter the Duck Deer rapids of 30 chains, over hornblende gneiss. This water can readily be run in fair sized canoes, but two portages of three chains each on the easterly side show evidence of considerable use. It is apparent that the Lau-

rentian contact occurs between the Iroquois falls and the first granite outcrop observed. As no exact information is obtainable I have placed the line of contact on the map half way between the two points.

Below Duck Deer rapids the river widens, in places to 20 chains, and several small islands occur, while affluent creeks of small size are numerous.

Cross-section Lines of Exploration.

Twelve miles below the rapids an expedition was made to the line, a distance of 11 miles. The first two miles traversed dry rolling clay land; the ordinary river bank territory. This is followed by two miles of low swampy country, passing into muskeg, but rising into another ridge of one-half mile of dry soil. Beyond is a swamp which continues to the line, interrupted by a third ridge of top land with poplar and spruce. As the boundary line itself traverses much the same type of country, it may be concluded that this region is composed of low wet tracts, interrupted in places by ridges of higher land running approximately north and south. Two miles south of this cross-section another was made for a distance of five miles with the following results:

- One-half mile of river bank, with poplar and spruce.
- Three miles of wet clay-bottom land, timbered with spruce.
- One and a-half miles of very level wet swampy land.

Opposite these two trails two others were made east of the river. Both of these seemed to indicate, for a distance of three miles, the presence of a somewhat higher country, well timbered with large spruce and poplar, but affected in places by windfall and fire.

Six miles farther down the river a small rapid occurs, easily run in any canoe. The bed of the river seems to be composed of Laurentian boulders, but no rock was seen in situ. Trips were made east and west from this point; that to the east showed low clay shores with the usual poplar, then a mile of low swampy scrub spruce land, followed by an area of clay rising to a height of 100 feet. For a distance of some miles the country maintains this elevation, but it is rendered almost impassable by severe and extensive windfalls. Among the fallen trees were

observed many goose-, raspberry and currant bushes. The fruit in all cases was small, and in no way to compare with the same in other parts of Northern Ontario. West from this rapid there is a narrow strip of swampy land, followed by clay upland for half a mile. Beyond is a small creek in a depression which is succeeded by a large belt of fine birch of 12 to 18 inches diameter.

For six or seven miles below this point the river continues a little west of north, receiving numerous small streams and ^{The Long Sault Rapids.} three of larger size, but none navigable. The current here begins to stiffen, and we pass a small island which may be considered the head of the Long Sault. Below this is 20 or 30 chains of rough and swift water, to a second small island of Laurentian gneiss and mica schist. The river drops three feet, necessitating a portage of a half chain over the island for small or heavily freighted canoes. Rough, swift and shallow water continues to a fall of six feet, passed by a 40-yard portage near the water's edge on the west side. The rock is gray mica gneiss and mica schist. A bay of a few chains in width with rough water must be passed to the next portage of seven chains, also on the west side. This portage can be avoided by large canoes going down, but the rapids are heavy and dangerous. Our party lost a canoe at this point in an attempt to run the rapids.

From the first of the Long Sault portages an expedition was made southwest to the line, at 170 miles. The trail traverses at first a mile of river bank with spruce and poplar badly affected by windfalls, and then continues for three miles in flat clay country with spruce and tamarac. This area is wet, but could scarcely be called muskeg. Returning I left the line at the 174th post and found the land high and dry to the river. It is well timbered, but the value is much reduced by windfalls. On the east side of the river an expedition northeast showed alternate narrow belts of muskeg and clay upland. The trail ended on a small lake with clear water and poplar shores. Below the portage the river is shallow, swift and rough for 40 chains and shows a stiff current for a mile more.

Six miles below the portages the line crosses at the 179th post. A mile farther down an expedition west showed a clean open bush of poplar and spruce for a half mile, then a mile of low wet land with red spruce.

It is rather remarkable that no trace of windfall was seen in this immediate locality. A short distance below another trip west for two and a half miles showed the usual high shore with a continuous wet tract beyond, cut by several creeks and dotted with beaver ponds. Opposite the 178th post the river bank is about a hundred feet high, but the characteristic wet land occurs half a mile in.

Tributaries and Rapids.

Three or four miles below the crossing point of the line the river turns sharply to the west and receives at the bend two streams, known as the Jawbone creeks. The westerly one rises in a small lake near the 200th post and flows approximately south. It is very rapid and shallow, and presents some exposures of gneiss. The easterly and larger stream is also a succession of rapids and falls, but is used as a canoe route. At one point it passes through a gorge in gneiss with walls 50 feet high. As far as could be observed the course is from the southeast. Among the gneiss boulders are found many limestone erratics, with *Zaphrentis*, *Heliophyllum*, etc. Around this bend in the Abitibi and on the Jawbone creeks high and dry land extends for a considerable distance inland, is exceptionally well wooded and free from *brulé* and windfall. Below the bend the river is ten chains wide and shows a strong current for five miles, when it forks around a small island and falls three feet. There is a portage of a couple of chains on the island, but the rapid can be run in fair sized canoes. The rock here is light gray gneiss and tender mica schist, striking w. 10° n. and dipping 45° northward. Below the rapids the river expands to a half mile in width and contains several small islands. Five miles down it contracts to one and a half chains and plunges with great violence down an incline of four feet over a barrier of gneiss running east and west. The portage is on the south side, and must be used with any

canoe. The current is stiff below this portage, which is known as Kettle Falls, and several islands occur before the river bends north at the point where it is joined by the Frederick House river. Five miles below the junction of this river the Abitibi receives a tributary known as Driftwood creek. A burnt tract occurs near the mouth of this Driftwood Creek. affluent and stretches three miles down stream; on ascending the creek however we soon pass into green bush. The general course of this stream is somewhat east of north. It has banks reaching an altitude of 100 feet three miles up, and presenting bluffs of 40 feet of fine stratified sand covered by stratified clay. A half mile beyond is an exposure of mica schist and quartz, striking northeast and southwest. Within the next mile are two portages on the south side, the first of 15 chains and the other of five. They are necessitated by rapids over gneiss. High hills with boulder clay occur at this point. A mile and a half of good water brings us to another 20-chain portage on the southeast side; above we cross a pond and make another portage of five chains on the west side past a falls of eight feet. Open navigation continues for five miles, when we arrive at a small rapid easily poled. A mile beyond is a very rough rapid with a fall of 20 feet passed by a portage over a high hill on the west side. No further obstruction occurs for two and a half miles, when a lift-out is occasioned by a fall of four feet. This is succeeded by four miles of good water to a long rapid not provided with a portage. At this point I was forced to return, but am of the opinion that a route of which this stream forms part is followed by the Indians into Mattagami waters. An extensive valley of denudation has been formed by this stream. A study of its banks proves that the stratified layers of sand and clay have in places a thickness of 100 feet. It is also to be observed that sand is becoming more noticeable than farther south, and that boulder clay begins to be conspicuous.

Five miles below Driftwood creek Singed Marten creek enters the Abitibi from the same side. It is about a half chain wide at the mouth, with low marshy shores. With the water at

Singed
Marten
Creek.

the summer level it is impossible to force a canoe more than half a mile up stream, but in high water it may be more navigable. To the north and west of this stream is an extensive spruce flat with areas of bad windfalls. A fair sized creek enters from the east about six miles farther down. It seem to flow from the south, but is so badly jammed with driftwood as to be entirely unnavigable. On its shores are seen coarse sand and clay, with gravel and limestone boulders.

One and a half miles below this stream the river contracts and forms two bad rapids, with a bay to the east between them. Both portages are on the east side and are only a few chains long. This is known as the Three Carrying Places. It probably gets the name from the fact that a third portage on the west shore runs past both rapids. At the first fall the barrier is 75 or 100 yards long and runs due north and south, the descent being 10 feet. The lower rapid is less severe, but probably has a drop of six feet. Both barriers consist of rough mica gneiss, hornblendic in places.

From this point an excursion was made to the line, a distance of 13 miles. The first two miles is hilly and well timbered with poplar, but beyond extends a low level spruce area alternating with muskeg to the line. Two or three small creeks were crossed and several lakes seen. These all show signs of having been frequented by beaver. A large number of these lakes are found in the swampy land inland from the river; none of them are of large size, nor can any of them be reached by canoe. The beaver however have tempted the Indian hunters, who have connected most of the dams by trails with the river. All along the Abitibi small creeks enter with great frequency. Judging from the country seen it may be that many of them have their origin in small lakes, possibly a long distance inland.

The line after crossing Jawbone creek follows a similar country. At the point where the trail met it (the 194th mile post) the soil was fairly dry and somewhat sandy; but this character is not persistent, as wet bottom land or muskeg prevails on the line as elsewhere.

Below the Three Carrying Places the river widens and contains many islands, while the current is stiff. Two miles down it narrows to a chain and a half, presenting a heavy current but quite smooth. Again it widens and has 10 or 15 islands for three miles, when a constriction and heavy rapids occur. This fall is in two sections; the upper part can be run by keeping the west shore and running into the bay beyond. However a short portage is provided on the west side. The lower rapid is much heavier and is broken by an island. Nearly all the water follows the the eastern channel; in fact in low water all of it. In high water the bay to the west referred to above would not exist, and it might then be more difficult to cross to the Island portage, which is on the island and is about two chains long.

At both these rapids the rock is gneiss, but just where the portage crosses the island is a peculiar lens-shaped inclusion, ten feet wide at the north end, but pointing out on the south shore. It apparently dips 45° westwardly. The inclusion is in places quartzose, in others highly altered, with much pyrite and magnetite. Under the microscope the rock shows augite as the prominent constituent, with a little quartz and plagioclase. The quantity of these is so trifling that the rock may be regarded as a pyroxenite. In the vicinity of this outcrop the gneiss itself is highly garnetiferous.

For the next 12 miles the river has a fair current and is bordered with clay and sand bluffs, the latter increasing in importance northward. These shore banks are, for the most part, clothed with young poplar. At the end of this 12 miles a considerable creek, known as Red Sucker, enters from the west. This stream was ascended two miles, in which distance three rapids were met. Beyond for two miles it is a continuous rapid over gneiss. The shores on both sides rise to the height of 100 feet and are composed of fine sand at the top and coarser materials below. Some pitch pine is found on the top of this ridge. A trip west from the foot of the long rapid, after passing the elevation, brings us to a long level spruce tract. Two small lakes were encountered, which, differing from the swampy lakes pre-

viously seen, present shores of fine sand and shingle. From this fact and from the drier nature of the spruce flat it may be concluded that the whole of this region possesses sandy soil.

Three and a half miles below Red Sucker creek the river turns to the west with increased speed. One and a half miles lower it plunges down a declivity, necessitating the Lobstick portage of a half mile on the east side. An interesting series of rocks is shown here. On a small island above the rapids are seen tender mica schists striking north-west and southeast and dipping 20° N. This is followed by a dark, highly garnetiferous rock, which appears to be an altered augite-syenite. At the brink of the fall the rock is a distinct augite-syenite. On the east side, at the portage, we have a dark fine-grained rock of a schistose nature, followed by what appears to be a quartz porphyry. This is replaced by a typical augite-syenite with pyrite. Below the rapids is gneissoid mica schist, very rough and with pronounced jointing. The conclusions are, therefore, that a barrier of augite-syenite crosses the river east and west, inducing certain modifications in the gneiss and being itself rendered schistose at its borders.

Below the Lobstick portage the river must be crossed in dangerous water to the Burntwood portage on the opposite side, which passes by a trail of 300 yards a very bad piece of rapids. A mile of fair water succeeds and different routes seem to be followed beyond, some portaging on the east and some on the west side. A high clay hill gives the name of Clay falls to this rapid, and there is a portage along the face of the cliff on the east side of the river, and another but little used a short distance beyond. The river at this point is wide and filled with islands. The hill at the Clay falls referred to above shows in ascending order—

20 feet fine sand interstratified with a coarser part and gravel.

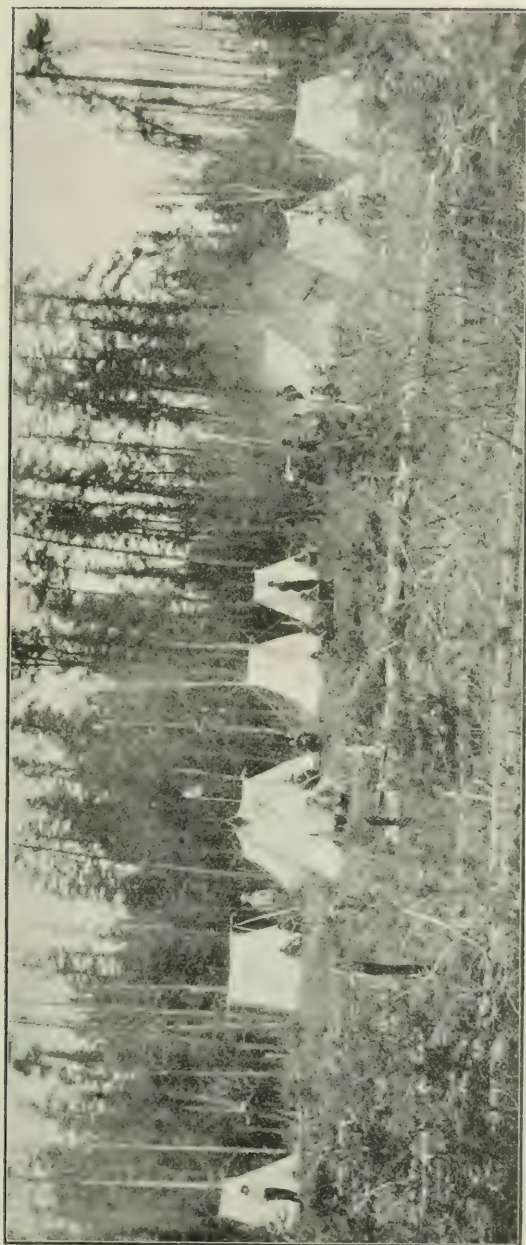
One foot of stratified clay.

20 feet of stiff boulder clay with limestone erratics.

20 feet of fine stratified sand.

10 feet of stratified clay.

A half mile lower is a level easy portage known as the Birch portage, on the east side





Surveyor Niven's Party at Luncheon, on Montreal River

Parks



H. B. Co. Factor and Family at Fort Matachewan, Montreal River

Parks



High Water Scene on Night Hawk Lake

Parks



Bernard McLeod, Trader, and Chief Buffalo, at Night Hawk Lake

Parks



Fort Matachewan, H. B. Co.

Park



Packing Supplies over Height of Land, Montreal River to Night Hawk River



First Falls, Upper Western Cascade, Frederick House River

Parks



First Falls, Lower Mobile Cascade, Frederick House River

Parks



Below the last of the Three Portages, Frederick House River.

Parks



Iroquois Falls, Western Cascade, on Abitibi River

Parks



Indian Packer at the Long Sault, Abitibi River

- Parks



Running the Long Sault, Abitibi River

- Parks



Supplies at the Long Sault, Abitibi River.

Parks.



Below Island Portage on Abitibi River.

Parks.

at a point where the river narrows to a chain and runs with great violence. A short distance lower is the Oil Can portage,

which enables the traveller to pass a strong fall. Both these portages have a length of 300 yards. At the foot of Oil Can portage the rock is augite-syenite or gabbro. As it contains both species of felspar it is difficult to decide, but it is probably the former as the outcrop at the Lobstick is evidently that variety. This rock strikes N. 30° W. and has a gray appearance, but the fresh fracture shows a distinct syenitic structure. Fine streaks of calcite and bands of a dark fine grained material traverse it in all directions. Above the Oil Can the rock is much coarser, with a highly syenitic appearance. At a sharp bend to the west 20 chains above the portage small quantities of a much altered diorite with sphene and mellilite occur. Here also are distinct veins of a hard black schist dipping 30° west, but not persistent in strike. Above the Birch portage the rock is highly feldspathic, and at the place where the river widens contains veinlets of crushed granite crossing in all directions and presenting beautiful examples of dislocation on a small scale. With small canoes and especially when ascending the river it is found advisable to follow another route in passing this series of rapids. The head of this trail leaves the river just where it turns west and the current stiffens about a mile and a half above the Lobstick portage. The first portage is one and a half miles long in a direction a little west of north; it is quite level over sandy soil and crosses two creeks. This ends in a lake which we cross nearly due north 25 chains. The next portage is only 100 yards, a little north of west to a lake of 13 chains. A 400-yard portage west of north over fine sand connects this lake with the next, a 15-chain pond. Then succeeds a 700-yard portage west of north followed by another 15-chain lake. A 100-yard trail over fine sand brings us to the last lake. From here a trail leads to the bay below the Oil Can portage. It traverses sandy soil and rises to a considerable height, falling suddenly as it approaches the river. Aneroid readings gave the top of the hill as 120 feet above the foot

of the Oil Can portage and the last lake 104 feet above the same point.

Canon of the Abitibi and the Otters.

We next cross a bay of a few chains on the east side of the river to a portage of two miles, leading past the canon of the Abitibi. This gorge has a height of 100 feet with precipitous walls, while immediately inland the country rises to an elevation recorded by aneroid of 200 feet. In this chasm the river is narrowed to about a chain or less and rushes with great violence throughout, causing a deafening roar in the confined space. The upper end of the canon presents rocks of the same nature as those described at the portages above. One half mile down occur segregations of anorthosite, and at a mile the rock is a weathered gabbro with stringers of crushed granite containing pyrite. The rocks here reach the greatest height on the gorge and are much mixed, with blebs and strings of associated materials. As we near the foot of the gorge we meet with large masses of crushed granite sheared north and south. As gneiss was seen a short distance below the canon we may conclude that the contact is very near the end of the rapid. Thus we have a belt of eruptive crossing the river a little north of west. Its southern part seems to be more acid, being represented by augite-syenite at the Lobstick portage. To the north it is more basic, passing into gabbro at the canon. Throughout the belt shows evidence of having been much contorted and broken by secondary minor eruptions.

Twenty chains below the canon the river is shallow and swift, presenting a rapid a quarter of a mile in length, but easily run. Expeditions east and west were made a short distance below this ripple. That to the east showed a bank of fine sand over a hundred feet in height, clothed with scrub poplar and birch, evidently an old brulé. This is cut by numerous small streams which have dug out deep valleys of denudation. Without much descent this gives place two miles inland to the usual succession of clay flat and muskeg. At an elevation of 75 feet occurs an outcrop of gray mica gneiss to the east of the river. The soil is sand, intersected by creek valleys.

Birch and
Oil Can
Portages.

Rocks of
the Great
Gorge.

One mile in, hornblendic gneiss is seen on a creek. Large poplar and spruce cover the whole district. From this point to New Post, a distance of six or seven miles, there is an occasional outcrop of gneiss, while sand banks are continuous for the stretch, showing terraces at 20 and 100 feet. New Post is the

New Post
Trading
Station.

only trading station of the Hudson's Bay Co. on the Abitibi, and is the only place where supplies of any kind can be obtained between Fort Abitibi and Moose Factory. Mr. Jobson, the factor in charge, has a flourishing garden in which are turnips, onions, potatoes, corn, cabbage, lettuce and radishes, all doing well. Early Rose potatoes were rotting in the ground, but white late varieties do well; 300 bushels were grown last year. Corn will ripen some years, but it fails on other occasions. Mr. Jobson has several head of cattle, the winter fodder for which is gathered by the Indians, and consists of the marsh grass abundant along the river. The soil is fine sand, argillaceous in places. As an example of the vagaries of the river, Mr. Jobson informed me that in the spring of 1897 the water rose to the foundation of his house, a distance of 29 feet. The Indians attached to this post are rapidly succumbing to the attacks of consumption and scrofulous diseases, and owing to the decrease of partridge and rabbit are sometimes at sore straits for food. As the rabbit fails the *lyux* also disappears for want of prey, while the beaver is almost hunted out in this district.

Little Abitibi River.

Half a mile below New Post a stream enters from the east. About two miles up this creek brings us to a very beautiful fall where the water drops 90 feet, almost vertically over gneiss.

An excursion to the Little Abitibi.

A portage from New Post 50 chains in length connects with this stream above the falls. In high water only can this river be ascended, as it is very swift and shallow. By dint of great exertion it was ascended 20 miles in a southeast direction. From here a portage of one and a half miles, broken by a little lake, leads into the Little Abitibi river. This latter stream was found to be a succession of rapids, but was descended 10 miles and a trail made from there

to the line, a distance of 12 miles. The usual poplar and birch were encountered on the shore of the little river, sinking into wet muskeg with scrub tamarac and spruce, which continues unaltered to the line. Three creeks and several small swampy lakes were met with, and the line intersected at 232 miles and 40 chains.

From New Post to the Otters the current is fairly heavy, but smooth. The banks are sandy and high, with gravel beaches and terraces, a feature never seen on the upper parts of the river where the vegetation reaches to the water line. The timber on this stretch (14 miles) is small poplar and spruce, with a little pitchpine.

The rapids at the Otters are extremely rough and picturesque, the river being forced between narrow banks and having considerable descent. The rock is red gneiss and bands of dark schist with pyrite. The portage is on the east side and is a wide open trail, with corduroy, evidently constructed by the H. B. Co. for the transport of large boats. The soil is sandy clay with gravel. The trail is crossed by two creek valleys, and there are two sharp descents at the north end. The portage is two miles long, but it may be shortened a half-mile by taking the river for that distance in the middle. The trail does not show that this is often done however.

A Region of Devonian Rocks.

Below the portage is a barrier of boulders requiring care to pass. A mile farther are two small islands and swifter water passing into rapids. There is a portage of 20 chains on the east side which does not appear to be much used. I found it necessary with the small canoe to portage part of the load. At this point outcrops the lowest member of the stratified deposits, being represented by a coarse red sandstone conglomerate. Twenty chains lower on the west side is 20 feet of the same deposit, interstratified above and capped with a dark shale dipping west and about ten feet thick. This is succeeded by ten feet of soft feldspathic sandstone, with a highly calcareous matrix and with crystals of calcite in the cavities. The whole is covered by a strong stony clay. Many landslips expose

Sandstone-
Conglomer-
ate and
Shale.

the face of the cliff, and blocks of other rocks not seen in situ are revealed at the foot of these slips. A little higher up the river, opposite the last described rapid, the sandstone is covered by 15 feet of hard gray clay, with boulders roughly stratified at the bottom, but not so apparent above. This is covered with sand and gravel. Almost immediately inland we pass into muskég.

The next rapid, the Sextant, is almost a continuation of the last; it is broad and shallow, a character shown by almost any rapid from here to the sea. This is of course on account of the difference between the stratified deposits and the harder Laurentian rocks. On the west shore at the Sextant a peculiar band of dark shale runs from the water's edge up to a height of 20 feet. It contains the remains of several species of algæ. The Sextant portage is one-quarter mile long on the east side. At its foot the red ferruginous sandstone occurs covered by shaly dolomitic limestone to a height of 50 feet; these limestones are arenaceous in places, and contain fossils of *Ambonychia*, *Orthis* and *Modiolopsis*. As nearly as I could determine there is a dip northwest of 23 feet in 60 chains.

One and a-half miles down is another rapid of the same character as the Sextant, with a half mile portage on the east side. The river drops six or seven feet, but the portage rises to a considerable height over clay soil. The rock here is a thick bedded limestone with numerous fossils, for example:

Favosites polymorpha.
Favosites turbinata.
Favosites hemisphærica.
Heliophyllum Halli(?).
Zaphrentis gigantea.
Zaphrentis prolifica.
Eridiophyllum.
Cyathophyllum.
 Crinoid columns.

Below this rapid the river maintains a northeasterly direction, is swift and shallow but not at all dangerous. Its banks are low for the most part, with clay and roughly bedded gravels. Six miles down we enter the Pudding rapid. The river here is 400 yards wide and correspondingly shallow. I believe the route

for large canoes lies along the east shore, but I proceeded down the west side, running part and wading through others. A mile or two of this brings us to a large island, showing thin-bedded limestones, and at its northern end a dark soft shale with fucoids apparently dipping north. Beyond this island is two miles of swift but easily canoeable water, filled with islands. The lower part much resembles the upper, and has a large island in much the same relative position. This island is bent into sharp anticlines and synclines, rendering it impossible to ascertain the strike or dip. Below the island the swift water continues, and the river is finally thrown with some violence against the west shore by a point from the east side. This is a well marked spot and constitutes the end of the Pudding; the water is not too rough for large canoes. With small boats it is safer to track on the east around the point.

Plum-pudding island lies a mile below the rapids; it presents clay shores much torn by river ice. Three miles more of somewhat shallow water with stiff current brings us to the Little Abitibi river on the east side. At its mouth this stream is 100 yards in width and a foot deep. Its water is brown, and its shores low, with young poplar. A description of the succession of rapids on this stream would be tedious; with the exception of a few short stretches it is all rapids as far as it was ascended, a distance of 30 miles. The more important of these are marked on the map. This distance cost nearly three days hard work to ascend, but, thanks to some heavy rains, we were enabled to run the whole way down in six hours. Limestone exposures occur on the lower reaches, a very fine one three miles up. This rock strikes N. 10° E. and rises into an anticline at the rapids. Fossils:

Rhynchonella sp.
Pentamerus sp.
Rensselaeria ovata; very numerous.
Dentalium sp.
Zaphrentis prolifica.
Alveolites sp.
Monticulipora sp.
Michelinea convexa .
Holopea?
Orthoceras sp.
Gomphoceras sp.

The
 Pudding
 Rapid.

Little
 Abitibi
 River.

Fossils
 of the
 Limestone

These are evidently different beds from those described on the Abitibi at the rapids below the Sextant. There the fauna is strongly coralline, while here it is more mixed, the brachiopoda being the most prominent group.

About a mile above this outcrop an exposure of gneiss occurs on the river, forming a strong rapid and rising into burnt hills on

the east. The contact here is beautifully shown, with corals growing on the ancient gneiss sea-floor. This gneiss exhibits a vertical dip, and is laminated northeast and southwest. The next rapid above is also over Laurentian rock, beyond which no outcrop occurs in many miles, when Devonian strata again appear with

Atrypa reticularis,
Cvathophyllum sp.
Michelinea convexa.

Several species of *Orthoceras* and numerous small gastropods and lamellibranchs.

It is therefore apparent that the gneiss outcrop must represent a Laurentian island in the Devonian sea, or an elevation of the gneiss from which the Devonian rocks have been denuded. At the end of the trip, 30 mil-s up, there is an apparent outcrop of gneiss which probably represents the contact. The rapids above are very hard and the river beyond is a constant succession of rapids to a large lake, the Little Abitibi, said to lie some distance to the southeast. The line crosses the river at the 212th post. Near this point gulls and flying loons were heard, so it is probable that the lake is not far distant from the crossing point of the line. A portage leads from the Long Sault rapids to the Little Abitibi river, whence the ascent is made to the lake. Along this stream high banks of clay and sand occur in many places.

To the west of the contact the hill rises 75 feet, and is composed of boulder clay at the bottom and gravel and sand at the top. Inland is a level sand area with pitch pine for 10 chains. Beyond this the country consists of muskeg with spruce and tamarac. This was traversed for three miles and found to become gradually wetter westward. To the east there is 30 feet of a clay hill followed

by 15 chains of six-inch spruce on dry soil. Wet muskeg succeeds, crossed by a ridge of dry land not far from the river.

The Little Abitibi may be said to occupy a valley of denudation in a very level tract of territory, having boulder clay at the bed rock and sand, gravel or stratified clay at the surface.

Below the mouth of the Little Abitibi the Abitibi is 200 yards wide with low shores. Three miles down is Barebone island with 100 yards of river on each side. This island is 20 chains long with stratified clay overlaid by sand. The clay is peaty, but a washing of it gave no indication of its having other than a recent origin.

Lignite in Clay.

Two miles below the island is swift and shallow water which continues to the Blacksmith rapids another two miles. The west

shore here was carefully examined for a mile above and below the rapids in order to locate the deposit of lignite reported by Dr. Bell and Mr. Ogilvie.

There is absolutely no exposure of shale or limestone above the water line. Lignite was found however in boulder clay, which was itself black with carbonaceous matter. The deposit was traced about 20 chains down the river. At the foot of the Blacksmith rapids on the east shore it outcrops a little above the water line and presents a more compact appearance and a roughly bedded aspect, striking $\approx 10^\circ$ s. and dipping by 15° n. From the fact that it occurs in boulder clay, and also because the dip and strike are quickly variable, I conclude that no inference can be drawn from these features. The deposit on the west shore bears 40 chains southwest from this outcrop. Seven miles down, on Little Cedar creek, and a mile up that stream, were found isolated pieces of the same lignite. These could not arrive there by glacial movement from the Blacksmith rapids, nor could river ice carry them that far up the small stream. It is therefore safe to conclude that deposits of the same nature occur in that region also. It is seen under the same conditions over 100 miles west, on the Missanabie river. The largest block found was two feet long by ten inches wide and thirteen inches thick. The

woody nature is quite apparent, but it is sufficiently altered to break readily across the grain. In the beds examined the separate trees were always apparent; in no case was consolidation observed. In the camp fire it was consumed by the aid of wood, emitting a disagreeably pungent odor. Analysis of a dry specimen gave—

Moisture, 8.016 p.c.
Volatile matter, 38.63.
Fixed carbon, 50.408.
Ash, 2.945.
Heating power, 6995 calories.

The occurrence in boulder clay would not indicate a local origin in the deposit; the carbonaceous nature of the clay itself points to considerable friction of transportation. These considerations lead us to conclude that the material will never prove of much value, but a more extensive examination is necessary in order to establish its ultimate importance. A few men with shovels and picks would be able in a few days to disclose enough of the lignite to settle the question of its value.

From two miles above the Blacksmith rapids trips were made inland with the following results:

East. Rise of 20 feet, sand hill with spruce and poplar. Creek north, 20 chains clay flat. Very wet muskeg.
West. Rise of 30 feet, 50 chains of level spruce and poplar land; 60 chains of dry spruce country to a stream flowing north, the Onakawana river.

The River below the Lignite Deposit.

The Blacksmith rapid probably takes its name from these deposits of lignite; it is shallow and 300 yards wide, with the deepest water to the east. It can easily be run. One and a half miles below the rapid a stream enters from the east, known as Big Cedar creek. At the time of my observations no canoe could enter it, although it may be navigable in high water. It is a stream of some length, as it extends still with considerable size south of the latitude of New Post. Two shallow rapids of no importance intervene between this stream and the Onakawana on the west side, three miles down. This river is very shoal, and 60 yards wide at the mouth. Rapids are almost continuous. Its immediate entry is from the northwest, but it soon turns south and runs not far distant from the Aitibi. It occupies a valley of denudation in boulder

clay and does not reach bed rock as far up as observed. The rapids occur over boulders of gneiss and limestone which are more numerous where the banks are high as might be expected. A little poplar is seen on the shores, but the muskeg begins immediately inland.

To the southeast, opposite the Onakawana, there are two belts of high poplar land, followed by muskeg of spruce and tamarac with a heavy undergrowth of alder.

On the main river two miles of smooth water is followed by swift and shallow rapids to the mouth of Little Cedar creek on the east side. A careful study of the surface geology was made at this point. There is 12 feet of level stratified clay at the river's mouth; three chains up this clay rises to a height of 15 feet and is underlaid by a hard stratified clay of a totally different aspect for four feet; this in turn, is underlaid by four feet of stratified sand and gravel. Below all is eight feet of boulder clay. Ten chains up boulder clay rises to the top of the hill; 20 chains up coarse gravel occurs over boulder clay at a height of eight feet. One half mile up we have 25 feet of stratified clay overlaid by two feet of boulder clay, in the top of which are found shells identical with species now living in James Bay. For example:

Tellina Greenlandica.
Maconea fragilis.
Maconea calcarea.
Saxicava rugosa.
Mya sp.
Several gasteropods and a species of *Pecten*.

Five chains above this are 25 feet of stratified clay, and 20 chains beyond boulder clay rises to the same elevation. The fossiliferous clay is black like the lignitic clay, and is overlaid by coarse gravel with cardium, gasteropods, etc. Across the Abitibi are 15 feet of stratified clay, apparently alluvial. At higher elevations is found a hard chalky stratified clay. It is therefore apparent that the rock is covered by boulder clay, which is overlaid irregularly by stratified deposits of recent date. In addition to these there is a belt of varying width following the river, consisting of alluvial deposits of still later origin.

An expedition was made overland, a distance of 12 miles to the line and five miles

beyond to the French river. Between the river and the line nothing was seen but flat wet muskeg and 12 small creeks flowing north. This trail crosses the line at the 275th post, in the middle of an exposure of gypsum having a diameter of three miles in all directions. The same muskeg country continues to the French river, but is even wetter and is dotted with several ponds.

For five or six miles below Little Cedar creek the river continues swift and shallow, with numerous small rapids showing ridges running about east and west. A trip east from here revealed a river bank only ten feet high, followed by half a mile of level land with eight-inch spruce; this passes into continuous wet muskeg with small red spruce. At various points in this muskeg I endeavored to ascertain the depth of the moss, but could not penetrate beyond a depth of three or four feet owing to lack of appliances and to flooding by water. At that depth the moss was quite perfect, no sign of decay being apparent; fragments of birch and small twigs of spruce were also well preserved. The moss is chiefly sphagnum, and as it extends over an enormous area, with unknown depth, it is safe to conclude that we have here an immense reserve supply of fuel in the form of peat. Regarding the extent of this supply it may be said that the deposits in question cover the whole region for 100 miles around the south and southwest sides of Hudson Bay. The line for the last 100 miles traversed an almost continuous tract of this kind.

The scenery through these immense stretches is unutterably dreary and monotonous; the whole region is perfectly level, without the slightest elevation to relieve the eye. Travel through such a country is of course very arduous, owing to the continual exposure to wet and to the immense swarms of mosquitoes and black flies engendered by the large stretches of swampy land.

The spruce over these muskegs does not average six inches in diameter, and can be of little use even for pulp wood. I do not wish to convey the idea that no spruce of value occurs in this northern region; as be-

fore stated, larger trees are found along all the rivers and lakes.

From the mouth of Little Cedar creek it is 25 miles in a northeast direction to the mouth of the Abitibi. The river has numerous islands and several rapids, all of which can be run down and poled up. The line crosses half way down this stretch, at the 288th post. For purposes of navigation the following list may be found useful:

- One mile, island of 25 chains.
 - Four miles, several 20 chain islands.
 - One and a half miles, shallow rapids and islands.
 - One mile, 30 chains of bad shallow rapids.
 - Two miles, pass three small islands.
 - Two miles, island, hard rapid, channel east side of west branch.
 - Four miles, shallow and swift, not rough.
 - Two miles, several islands and some shallow water.
 - Four miles, three large islands.
 - Three miles, islands and swifter water where the river widens and passes into the Moose through several mouths.
- At the end the rapids become heavy. It is advisable to run down the west shore as far as possible and make a portage past the worst part. The portage is about ten chains long and avoids a very bad swell. Care is required below the portage, as there is still rapid and shallow water. The rock here is a thick bedded non-fossiliferous dolomitic limestone, 12 feet in thickness.

Moose River and James Bay.

The Moose river at the mouth of the Abitibi is over a mile wide, is shallow and fairly swift. A clear sight N. 40° E. (mag.) bears on a green point on the south side. In this distance are two long shallow rapids which can be best passed by crossing to the north side of the Moose as soon as possible after leaving the Abitibi. This manoeuvre also enables the traveller to avoid a long bar stretching into the river from the above mentioned point on the south side. From here the course lies 66° E. of N. for six miles to a point on the north side. In this stretch are two small rapids. A mile below the point, at a bearing of 80°, is the last rapids and the head of tide-water. Throughout this distance the north side is preferable, both for the reason already given and from the fact that the clearer waters of the Mattagami and Missanabie keep to that side and do not mix with

the muddy water of the Abitibi to the south. Below the last rapid it is seven or eight miles to Moose Factory. A chain of islands occupies the middle of the river, which widens to two or three miles. Moose Factory is on the south side of Moose island; the traveller should keep along the north side of the islands until seven miles down and then turn south between them. All along the Moose river and on the islands appear deposits of boulder clay or of strong stratified clay. Inland the country is very flat and shows the characteristic muskeg. With gradually increasing width the river continues 12 miles below the Factory and enters James bay. It is impossible for a ship of any size to approach nearer than this to the Factory.

Head of Navigation on the Moose. The Company's vessel, the Lady Head, anchors at this point and discharges her cargo into lighters which are towed by a small tug to near the port, where a second transshipment into small barges is necessary in order to effect a landing. Outside the anchorage are bars which require all the skill of the pilot, taking advantage of high water, to pass.

Features of James Bay.

The Rising Region of James Bay. James Bay is so shallow that 15 miles of shore is said to extend between high and low water a few miles north of Moose river. That this shallowness is due in part at least to the fact that the whole region is gradually rising may be seen from the following observations:

1. On Little Cedar creek at a height of 25 feet above the stream, which probably represents 100 feet above tide water, were found shells of animals now living in the bay.
2. Old inhabitants of Moose Factory unite in saying that islands in the bay, which were mere specks within their memory, have obtained considerable size, though seldom, if ever, covered by the water.
3. A marshy island opposite Moose Factory, which is now at least a half mile long, is well out of water at high tide, although covered with water only at the time of the spring freshets. Within the memory of men now living at Moose Factory it did not exist at all.
4. A river of the size of the Moose would have cut a channel some distance inland had

not some such secular movement negated its action.

The shallowness is in part owing to the silt which is borne into the bay by many of the rivers entering it. Whether the bars now existing are constant in position is hard to determine on mere information. In conversation with men at Moose Factory I received the most contradictory information on this point. This is a matter of importance because, if shifting in nature, these bars would require constant dredging in order to keep a channel open. If constant in position I would conclude that the rush of tide and current would tend to keep them open.

Whether a harbor is possible at Moose Factory is a question entirely outside the scope of this report. I give these few facts and must let the reader draw his own conclusions. I am certain however that it could be done only at a great outlay.

Commercial Aspects.

There are no fish of any account in the Abitibi. Whether or not they are numerous in the bay is again a questionable point. Fish and the Fur-bearing Animals. I have heard that fish were so scarce that it was difficult at any time to obtain a mess. On the other hand, schools of fish were so compact as to impede the navigation of small craft. The most reliable information seems to point to the scarcity of fish of any commercial value. The fur-bearing animals do not seem to be seriously decreasing. Otter, fisher, marten, fox (red, silver and cross), mink and beaver are still numerous, and the annual yield is about the same as formerly.

Moose Factory is over two hundred years old, and has been for some time the main point on James bay. Moose Factory. Here are situated the head offices for the region; as the vessel from England lands all supplies here it becomes the centre of distribution for the whole bay. The population is about 200, consisting exclusively of H.B.Co. employes and their families. Several hundred Indians are connected with the post. The company has a small sawmill which manufactures lumber (spruce) for all the posts on the bay. A boat building shop is also maintained, which has turned out vessels capable of crossing the open bay.

Moose Factory also constitutes the headquarters of the Church Missionary Diocese of Moosonee. A substantial church has been erected, as well as a residence for the bishop. Outlying stations have been established at Fort Hope, Fort Albany, York Fort, Rupert's House, etc. The Indians are all, nominally at least, Christians; most of them are able to speak English and to read and write in their own language (Swampy Cree). They use a system of phonetic spelling well adapted to the language. South of New Post the Indians are Ojibways, and adherents of the Roman Catholic church. These Indians do not use the phonetic writing, but can write in the ordinary characters as taught by the Catholic missionaries.

French River.

On the south shore of the Moose, opposite the last rapid, the French river enters. Its course is a little east of north for the last 32 miles. Above that point it divides into two streams, which again bifurcate and reach more more than 100 miles inland. To the east, by means of tributaries and small lakes, a route leads to lake Sagima, which enters James bay by the Forty Mile river that distance east of the mouth of the Moose. To describe all the rapids and other features of this 32 miles would be very tedious. Suffice it to say that the river is 100 yards wide on an average, expanding in places to a half mile and filled with islands. The current is strong all the way, but no portages are required as all the rapids can be poled. The more important of these are indicated on the map. The shores resemble those of the Abitibi in the same latitude. Many limestone outcrops occur. Some high banks are seen in which are fossils resembling those found on Little Cedar creek. Above the fork the east branch was first ascended. Five miles up it is a large deposit of gypsum, 20 chains long and 12 feet thick. This is the thickness of the exposure, but the whole thickness of the bed is indeterminable. This deposit is mostly gray in color, but pure white granular gypsum also is seen as well as patches of well crystallized selenite.

Six miles above the junction the stream breaks into two, the Ka-wuk-e-ka-mas-tuk to

the east and the Wa-kway-ow-kas-tik to the west. Both were ascended a short distance and found to become more shallow and rapid. The eastern main branch was also ascended six or seven miles and found to be the same as the other two. It is crossed by the line several times, as shown on the map, and is known as the Kah-pah-nay-ow-sis-tik.

Summary of Exploration.

The region covered by this report may be considered as the basin of the Abitibi river, including the district around Frederick House river and Nighthawk lake. A detailed description has been given, and in the following summary will be found a general description under various heads.

Abitibi River.

The word Abitibi has a somewhat obscure meaning. It is possibly best translated as the river whose waters shine white at a distance; referring to the muddy nature of the water. From the two portages to the Otters, while there are many rapids, the intermediate stretches can be ascended without the use of a pole. Below the Otters, over the limestone area, the river is much more shallow and continually swift. It has already been noted that the general appearance of the upper river is in sharp contrast to the lower portions. This is best seen in the fact that the river is deeper at its margins above, permitting a canoe to approach close to the shore while the vegetation reaches to the water's edge. Below, this is entirely different, as the margins are shallow, forcing a canoe some distance into the river in order to float with safety, while beaches extend all along the limestone region.

Soil and Agriculture.

Large areas of dry clay soil extend around the Upper Abitibi and in the region of Nighthawk lake, while sandy tracts occupy the districts northwest of Frederick House lake and the height of land between this lake and the Black river. Throughout this section, on passing inland, we come to extensive level tracts, wet in places but underlaid by firm clay soil. If these stretches can be drained in the process of clearing it would open up

Drainage
system of
the River.

Character-
istics of the
River.

Gypsum
deposit in
the East
Branch.

Areas of
Clay, Sand
and Muskeg.

the major part of the country as far north as the Big Bend for agricultural purposes. All along the river as far as this point the river-bank itself, with a width of two miles, is now sufficiently dry to take the plow. North of this Bend the country is decidedly wetter at any distance from the river, and cannot be described as other than muskeg. The river bank is still dry and high, but is not composed of as good soil, being far more sandy and covered with a less luxuriant vegetation. No considerable areas of arable soil exist on the lower river. The line itself for the last 100 miles traverses almost continuous muskeg. The climate permits the raising of roots, but it is a question if cereals will ripen. Barley has been raised at Moose Factory, but its maturing cannot be depended on. For stock raising I think certain parts of the country would prove excellent, as grass grows well and the crop of roots would furnish good winter fodder.

Timber Resources.

With the exception of a few small isolated trees no pine was seen in the whole district.

Along the rivers and on the shores of lakes the timber is uniformly poplar and birch, the rough bark variety of the former tree increasing to the north. In the wet clay flats spruce of fair size extends over large areas. This timber will eventually be of great value for pulp wood. Trees of a large size are not numerous, the average being about ten inches. In the muskegs very small and useless red spruce predominates, extending over hundreds of square miles in the northern part. Some cedar is seen, but not enough to warrant a permanent industry. Alder, hazel and several species of willow are the characteristic shrubs.

Mineral Resources.

Excepting on the rivers no outcrops of rock are seen in the whole region, so well is the country covered with soil. Few exposures of rock. Where observed the rock is barren; only two substances of economical value being seen—the previously described lignite and the deposits of gypsum. At the head waters of the Black river rather better looking rocks were seen; I understand that some

finds of gold and copper have been reported on the Rivière Blanche. It may be that prospecting in this region might be rewarded.

Water Powers.

The volume of water in the Abitibi, while subjected to enormous variations, is always sufficiently great to develop power at several places. On this river at the Iroquois falls is an ideal location, with a vertical drop of 24 feet. Another excellent place is the first falls on the Frederick House river, where we have a 46-foot descent in the distance of two chains. Where vertical falls are not the rule on these rivers, we have sufficient descent within a few chains at the Oil Can portage, the Lobstick portage, the Three Carrying Places, and possibly the Sextant.

Fur and Game.

Small game, as partridge and rabbit, are not numerous. Duck are said to be plentiful on Nighthawk lake in the spring, but they are very wild in autumn. Very few are seen on the lakes and rivers farther north, but the Indians report them to be numerous on the bay, although very shy and hard to obtain. In the southern parts of the district moose are coming in from the west; red deer are almost absent, while caribou are rare. The small swampy lakes which abound in the level clay areas have at one time swarmed with beaver, which, though still plentiful, have suffered considerably from the improvidence of the hunters. As a whole the region may be considered a fair producer of the ordinary fur—fox, otter, fisher, marten, mink and muskrat.

Geological Features.

Huronian rocks, consisting of altered diorites, pyrites, gray quartz schists and some soft decomposed schists occupy the country to the south, extending as far north as the head of the first long rapid on the Frederick House river. The line of contact of this belt crosses the Abitibi below the Iroquois falls. From this point to the Lobstick portage Laurentian gneisses and mica schists crop out occasionally. The narrow Huronian belt from the Lobstick to the foot of the Canon or Long portage consists mainly of augite-syenite,

passing into gabbro to the north. Beyond this portage Laurentian gneiss extends to the Devonian contact above the Sextant rapids. The whole region surrounding James bay is occupied by Devonian strata of sandstone, shale and limestone, the latter rock predominating. In these limestones Dr. Bell has reported gypsum and clay ironstone; the former only of these substances was seen.

^{superficial deposits.} Regarding the surface geology, the superficial deposits in the southern part is uniformly stratified clay. Farther north boulder clay is overlaid by sand and stratified clay. The mantle is of considerable thickness, reaching to 100 feet or more.

Missanabie River.

The return trip was made via the Missanabie river. In the following paragraphs will be found a short synopsis, dealing chiefly with the navigation of the river:

In the Devonian Belt.

From Moose island to the mouth of the Abitibi has already been described. For 16

^{Navigation of the River.} or 17 miles above that point the river is wide and shallow, with many swift places and three that might be called rapids, the last a fairly heavy one. Numerous islands occur here and the river is wide. Five miles up, after passing a mile of continuous shallow rapids, is an open stretch for a mile and a half through an extensive deposit of gypsum known as the White Rocks. Above these beds the river narrows and contains some large islands. I followed the northern channel and passed two hard rapids. Six miles above the White Rocks is Gray Goose island, past which the water runs with a stiff current, but is not shallow or rough. To Poplar isle and the junction of the Mattagami is about six miles of fair water. Above the fork the river is continuously shallow and swift for eight miles, beyond which is ten miles of fair water, but showing a good stiff current. Four miles more is a strong rapid and a mile beyond another with constant bad water to a small creek three miles above the last rapid. Above this creek are three rapids and then better water past the mouths of three rivers on the north side known as the Waboose, Atagawan and Ash rivers. Beyond the last

of these is swift water and a rapid one-half mile up. A mile or two beyond the Poplar river enters on the south side. This is a stream of considerable size and serves well as a landmark. To two streams entering close together on the north side is ten miles. On this stretch bad water extends for a mile above Poplar river, followed by a piece of good water to three rapids separated by hard stretches of a mile each. Above these streams fairly smooth water extends for two or three miles, when we pass a small island. For four miles good and bad water alternate to a fairly hard rapid. From here to the Wabiska-gami river on the north are ten miles of good water. Coal river enters from the south 10 or 12 miles on. In this reach the water is good, broken only by two minor rapids about half way. The banks here are high and consist of clay, scarped in places, and showing deposits of lignite resembling those on the Abitibi. Eight miles beyond the Coal river the Missanabie turns abruptly to the south. Two miles beyond it passes out of the Devonian area and enters a Huronian belt.

In the Huronian Belt.

In the course of six miles southward we have a rapid, then two miles of fair water to three bad rapids. Above these is still another strong one which is best passed on the west side and a crossing made above to the foot of the Long portage on the east side. This portage is one and a half miles long and is fairly level. Above it, it is necessary to pole one and a half miles to the Stone portage of one-half mile on the same side. Between the Stone portage and the Riverside portage on the opposite side (three miles) are several hard stretches requiring poling and traiking. The Riverside portage passes a very picturesque gorge in which the river narrows to less than a chain; it is a half-mile long and level. Twenty chains of easy poling bring us to the Conquering House portage, also on the west side; it is short and easy. A few miles of good water extend above this portage, when we enter a series of rapids, consisting of four main ones and some minor ripples. Good water extends to the mouth of a river of some size from the west known as the

Landmarks
of Rapids
and
Portages.

Mattawishquaia. Four miles farther brings us to Lower Skunk island, before reaching which we ascend three rapids. There are three of these islands, known as Lower, Middle and Upper Skunk islands. From the lower it is five miles to the Kettle portage, below which are some rapids. The portage is on the west side, and short. Above are almost continuous rapids, then a mile of fair water to the Black Feather rapids, which are rather heavy. The lower part was poled, but with the small canoe it was found necessary to portage the upper part. Five or six miles of good water, broken only by one or two ripples of no importance, bring us to the Rock Island portage of three chains. From this portage good water extends seven miles to Kakagee rapids. They are fairly heavy; a lift-out was found necessary at one point.

Between Kakagee and Sandy bay, a distance of six miles, are four rapids, the first two light, the third heavy and the last at the foot of the portage. Sandy Bay portage is short, on the east side and past a very pretty fall. Three miles of good water bring us to Sharp Rock portage. This is a chain in length and over an island. Good water extends above Sharp Rock portage for two or three miles, when a portage is necessary on the west side. Above, poling is required for 20 chains, when we make the Beaver portage of 15 chains, also on the west side. Beyond the water is swift, rendering poling necessary for a short distance. Good water succeeds to the Albany rapids, a distance of nine miles from Sharp Rock. In these rapids the river is broad and shallow and there is a considerable fall. The rough water extends for 20 or 30 chains and can all be poled. The Albany river enters from the west a short distance above these rapids.

From the Albany river to the Devil's rapids is eight miles, the first part of which is good water to a sharp turn known as Wilson's Bend. Then succeeds swift water to the Devil's rapids. At this point and above are nine hard rapids; I found it necessary to portage three times, the last by the Sugarloaf portage on the west side. Twenty chains above is the Achuter portage on the east side. Three miles of good water bring us to the Double portage on the east side.

This portage is 25 chains in all, but is broken in the middle by a bay of the river, whence its name. The Brunswick river enters on the west side four miles above this portage. Four miles above the Brunswick river a hard rapid is caused by a spit of gneiss from the east side. Four miles more brings us to a small ripple followed by nine miles of good water to a heavy rapids requiring a lift-out. A small chute, with a drop of four feet, occurs three miles up. Six miles from here, after passing a river of some size, we arrive at St. Paul's portage on the east. A little rough water follows, and then good paddling to St. Peter's portage on the west side. In the next three miles are two long rapids to pole and then a half mile portage known as the Greenhill. It is on the south side and occurs where the river makes a bend to the north. It turns south again beyond the portage, and a mile brings us to the Wavy Rapid portage on the east side. Just beyond the river turns north again and we make another portage over an island. A short distance up is another rapid and a portage on the east side; below it is a stretch of bad water and two small ripples above. Beyond the river resumes its southerly direction, and a mile brings us to a short portage on the east side known as the foot of Swampy Ground portage. This is followed by 14 miles of clear paddling through a level swampy district. A series of rapids follows. A portage on the east side of ten chains passes the first; the next two must be poled, and the last may be run or may require a portage according to the size of the canoe. A little beyond a long rapid breaks the river for over a mile. It may in part be poled, but short portages are necessary. Another means of avoiding this obstruction is to make a half mile portage on the west side into the Nottawa river, which enters the Missanabie above this rapid. This stream is now so choked with driftwood that after descending 20 chains another half mile portage is required to regain the river. Three small rapids obstruct the navigation at intervals above the Nottawa. Clear water then continues for five miles, when two hard rapids occur. The first can be poled or tracked, while a well used portage of a few chains enables us to

pass the second. Three miles above this we enter Missanabie lake. The course is along the northerly shore, in a southwest direction, for 20 miles to a rocky point, where another arm from the north joins the lake. From this point we cross in a westerly direction to the opposite shore, follow it north for a mile and arrive at Missanabie portage. This portage of ten chains leads to a long thin lake ten miles in length. The Height of

Crossing the Height of Land into Dog Lake. Land portage passes out of the extreme western end of this lake and enters Dog lake. It is short and somewhat swampy. Dog lake is very crooked and is crossed in three places by the Canadian Pacific Railway. From the portage to the station is eight or nine miles, but the route

is so crooked that I am not in a position to describe it.

Before closing this report I wish to express to Mr. Niven, to Mr. E. Neelands and to Mr.

Acknowledgements. W. S. Ritchie, members of his party, my sincere thanks for assistance afforded me during the summer. My gratitude is also due to Mr. Broughton of Moose Factory and to Mr. Jobson of New Post for valuable information and kindly treatment, and to the Very Rev. J. A. Newnham, Bishop of Moosonee. I am also indebted to Professor Coleman of the University of Toronto and Geologist to the Bureau of Mines for valuable advice and assistance in the preparation of this report.

GOULAIS RIVER TO DALTON.

By W. A. Charlton, Jr.

PURSUANT to instructions received from the Director of the Bureau of Mines to accompany the survey party of Mr. Speight, O.L.S., upon a Meridian Line to be run from the north end of the line between the townships of Hodgins and Whitman due north to the main line of the Canadian Pacific Railroad at or near Dalton, I left Toronto July 9, 1898, in company with Mr. Speight and his assistants, and arrived at Sault Ste. Marie the day following.

The starting point of the line between the townships of Hodgins and Whitman could be most easily reached by a walk of twenty miles inland from Garden River, but it was necessary that some of the party should come in with the canoes by way of the Goulais river. My instructions required me to accompany Mr. Kennedy, forest ranger, in side-trips from the line, and to undertake a geological exploration of the tract traversed. Subsequently I was detailed to accompany Mr. Kennedy into the country east of Batchawana bay, watered by the rivers Batchawana and Chippewa.

In and Around Garden River.

Garden River, situated upon the Indian Reserve ten miles east of Sault Ste. Marie, is a most picturesque spot and well merits its name. The soil there is sandy, but fine crops of potatoes, cabbage, etc. are raised and the pasturage is excellent. At Echo bay, five miles east, the land is a good clay loam and is the centre of an industrious farming community.

One mile north of Garden River station, on the road leading to Hodgins township, we passed extensive gravel beds, the property of the Canadian Pacific Railway Company. Beyond these the country on both sides of the road is well timbered with maple and birch. For ten miles the road is good and the slopes gradual, after which high rocky

hills are encountered. Several swift running streams were passed, two with gray clay bottoms at the points of crossing. Along the roadway timothy was growing to a height of three to four feet, indicating that the country if cleared would make meadow and pasture lands of the first quality.

At about eight miles from Garden River a stretch of red sandstone crosses the road, and again near the eleventh and near the sixteenth mile similar stretches were passed. As we neared the Goulais river the country was seen to become very rough and mountainous, and from the hill-tops a good view of valleys well-timbered with spruce was obtained.

The Goulais River Valley.

Where the road first reaches the Goulais river the Sault Ste. Marie Pulp Company

have established headquarters for their winter camps. Here is a considerable clearing, and potatoes cabbages, turnips, carrots and onions were growing. The clerk informed me that this agricultural stretch extended, brokenly one-half to one mile on each side far down the river. But above these camps the hills close in, leaving little level land between the river and the rough upland. The north bank of the river here is of sand and gravel, the south bank is a gray clay. A few miles from the headquarters of the Pulp Company's camps is a prospect owned by the Chicago Lumber Company. Samples of ore shown me were well mineralized with galena copper and iron pyrites. I understand that a fifty-foot shaft was sunk in 1897, and that some drifting has been done.

Rock Formations of the Line.

For six miles above the camps the bed of the river is mostly gravel and sand, with stretches covered with large pebbles; a half mile west of the line and one and a half miles from its starting

Rocks of the Cambrian System.

Agricultural lands on the Goulais.

From Garden River to starting point.

Laurentian Gneiss.

point is a series of falls, 35 feet in all, with a portage on the east bank three-eighths of a mile long. These falls are over rock of the Laurentian gneiss, and below the river bed is well filled with boulders, mostly weathered gneiss and granite. East of the falls is a morainic deposit of gravel and sand, here 120 feet high and extending northeast, along the eastern side of which a stream 20 feet wide flows southwest, emptying into the river. About four miles above the falls several clay banks were noted on the west side of the river, one 70 feet wide and 25 feet high of gray strata. The water trickling down these banks was cold but soft. At this season of the year the river is quite shallow, and the current being swift, averaging over two and one-half miles per hour, it is necessary to pole in ascending by canoe.

At the second falls, near the 5th mile, a band of schistose rock 200 feet wide crosses the river, showing evidence of intense pressure and crushing. The rock is chiefly mica schist, but in places were sericite schists heavily charged with copper pyrites. A hard dark-gray rock with pitted surface walled the schists on the lower side. Up the bank, above the sweep of the water, this rock showed little circular masses of hornblende crystals upon the surface. Above the falls, on the east bank, rises a granite bluff nearly 700 feet high, and from the top of this a great number of similar risings were seen in the surrounding country.

On a trip east of the 3rd mile a hornblende-granite gneiss was encountered, but the general country rock is the mica gneiss. At the 8th mile a contact of the granite-gneiss with an altered dark gray diorite occurs, the strike being west 10 degrees north. The diorite belt does not extend far, for two miles further on at the next exposure of rock (a wooded belt having been crossed) granite-gneiss is again met. One and one-half miles west of the 10th mile, crossing a tributary of the Gouais, is a large vein of quartz interbedded with much chlorite schist and carrying iron pyrites, chalcopyrite and bornite. The wall on either side was granite gneiss, the direction of the vein northeast and southwest, and at this point was a perpendicular fall in the stream of 35 feet.

The bed of the creek below and above was full of boulders, weathered granite, gneiss, diorite, diabase and some fragments of schists.

Between the 15th and 16th mile there is a contact with the gneiss of a coarse-grained, hard gray granitoid rock, north 10 degrees west, and this gives place beyond the 16th mile to an area of slate and hornblende schist. Chlorite and sericite schists were met with on the shores of little lakes in this vicinity and up to the 21st mile. Beyond the 21st mile granite-gneiss again appears prominently and continues unbroken to the 26th mile, where slate and chlorite schist cross westerly. Some lean-looking quartz veins were passed in this locality. Two miles east of 26th mile slate was passed close to a little lake, but this seems to be included in the gneiss which appears at the 27th and continues to 30th mile, showing much mica. Between 30th and 32nd mile several areas of hornblende schists were noted, and two miles west of the 32nd mile a contact was crossed west 10 degrees north.

To the east of the line between 36th and 38th mile several parallel dikes of diabase cut through the gneiss in a north-westerly direction and west of the 37th mile diabase dikes, green schists and phyllite parallel to the first named were passed. East and west of the 36th mile the country is a succession of high bare bluffs, and the river a series of chutes and falls for some distance below the line. But a little northwest of the 37th mile, the land is lower and more level, the hills presenting the appearance of having been worn or ground down, being low crowned and flat and covered with a mantle of gravel and white sand. Numerous little lakes were passed here. About three miles west of 38th mile diabase dikes and small areas of hornblende schists extending northerly were observed. Between the 38th and 39th mile two little lakes cross the line, around the shores of which is much green schist. From the 39th to the 40th the country is well covered with white sand and organic matter.

A Stretch of Montreal River.

A branch of the Montreal river crosses the line at the 40th mile, and beyond this the white sand extends three-quarters of a mile to a high

hill of Laurentian gneiss which rises abruptly 215 feet and slopes to the west, meeting

the Montreal river a quarter of a mile west, the river here cutting through the rock and falling 35 feet

or more. We crossed the Montreal river again at intervals up to the 51st mile, and during this distance I followed the banks on foot. On the western bank, at about the 42nd mile, an area of intrusive diabase 600 feet wide cuts through the gray granite and gneiss north 30 degrees west. Several dikes of the same

rock were passed while crossing the hills east of the river between the 43rd and 45th mile, and a large area of saussurite-gabbro. These lay parallel or nearly parallel to each other, the strike varying from 20 to 30 degrees west of north.

From the 41st to the 47th mile the land is rocky and uneven, with many high hills and bluffs, and the country rock is well impregnated with iron. At the 47th mile begins a stretch of comparatively level lands well covered with sand, with areas of moss and muskeg. This stretch extends brokenly to the 59th mile, and rock exposures show a coarse-grained crumbly biotite-gneiss throughout this distance. A *brulé* extends from the 49th to the 54th mile.

At the 59th mile, on the north bank of the Mattawan river, a hard gray medium-grained granite-gneiss succeeds the poor variety of the last ten miles.

Beyond the bank of this river there was little rock exposure up to the 73rd mile, the country generally presenting a rolling stretch of muskeg and ridges with some hills covered with sand and well wooded. East of the 70th mile and extending to the north for three miles and to the east for several miles, is an extensive sand plain with stretches of jackpine.

Mattawan River to Lake Windermere.

On September 19th Mr. Kennedy and I left Mr. Speight's camp to explore the shores of lake Windermere. We left at the 73rd and rejoined the camp at the 83rd mile. Several bays of Windermere were entered and explored, rock exposures revealing a common whitish granite-gneiss. Several beaches of white and red sands were

noted, particularly along the south shore of the main body of water. From lake Windermere we followed the outlet west and north towards Dalton. Gneiss predominated, but areas of true granite were

passed at points west of the 84 to 85 and 86 to 87 miles. Talc schists were observed west of 84 to 85 miles. About west of 88 to 89 miles the river enters an area of sand and gravel with banks varying from 10 to 30 feet high. We made a portage somewhere in this region crossing to a little lake, and thence over the sand plains to the railroad track one mile and a quarter east of Dalton. The next day was spent upon the hills north of lake Windermere, which presented seemingly a high gneissic glacial-swept area. Some prospecting has been done there this summer, and I was shown white quartz with galena. I crossed a considerable area of rock country, finding nothing but gneiss of the Lower Laurentian. Several dark dikes were noted, fused into the light country rock.

Natural Resources of the Country.

The Goulais river is a swift-flowing stream, rising in springtime six feet above the level

at this season. Its valley is well timbered with spruce, tamarac, balsam and other woods, with numerous spruce and hardwood (birch and maple) bluffs on either side. The river crosses and recrosses the line several times up to the 8th mile, where it turns, coming almost directly from the east. Three falls were passed between the 1st and 8th mile, and on two of these some blasting would be required for log-driving. No large stream was crossed after leaving the Goulais until we reached the 26th mile, where a branch of the Chippewa rises one mile west of the line. Between the 27th and 28th mile the first branch of the

Batchawana was crossed, and subsequently these second and third branches between the 32nd and 33rd and 36th and 37th miles respectively. The general slope of the country so far is to the southwest, and a majority of the little streams met were swift flowing. Few lakes were met on our side trips, the country being very rough and uneven and unfavorable to reservoirs. From

the 6th to the 30th mile neither cutting nor trail indicated that hunter or trapper ever visited this region, and there were but few signs of game. Beyond the 30th mile game is more abundant, and the country is visited chiefly by Chapeau Indians.

At the 36th mile the Batchawana river presents a series of falls, which we followed for some distance down. No portages showed that this river had ever been travelled through here. Above and northeast of the line the river is broader and quite navigable, and is connected by a chain of lakes and portages with Montreal river, the route entering the latter at a point about six miles west of the 39th mile.

Some areas of white pine were passed or sighted on our side trips. Up to the 20th mile the country traversed was timbered chiefly with black birch and maple, except in the valley of the Goulais and its tributaries, which contains much spruce; but other woods—ash, elm, cedar and tamarac—were noted as well. Beyond the 20th and up to the 30th mile the timber is smaller,—white pine, spruce, tamarac, and cedar, with extensive areas of poplar and white birch. Between the 30th and 33rd mile the wood is small, and of no commercial value, with no pine on either side of our course, but east and west of the 33rd to the 35th mile are both spruce and pine, with hardwood hills of maple and black birch. Between the 35th and 36th mile the line passes through a brulé, and the bare bluffs extend at least seven or eight miles to the west, while to the northwest and northeast are spruce and hardwood hills, and in the valley of the Batchawana to the east and north small spruce and balsam. West of the 37th to the 40th mile the timber is small with much underbrush of hazelwood, but at the line and to the east there is better growth of spruce, tamarac, birch and small maple.

On the Montreal River.

Along the Montreal river from the 40th to the 51st mile, small spruce, balsam and tamarac, and some ridges of good spruce and white pine were passed. Along the hills to the east of the river blueberries, pink cherries and high-bush cranberries were plentiful. Spignet was found

on the banks of this and the Mattawan rivers.

The brulé which was crossed from the 49th to the 54th mile was well-covered in places along the east bank of the river with rich long grasses. Blueberries and raspberries grew in great patches. The burned area stretches from two to four miles on each side the line and extends in a west by northwest direction.

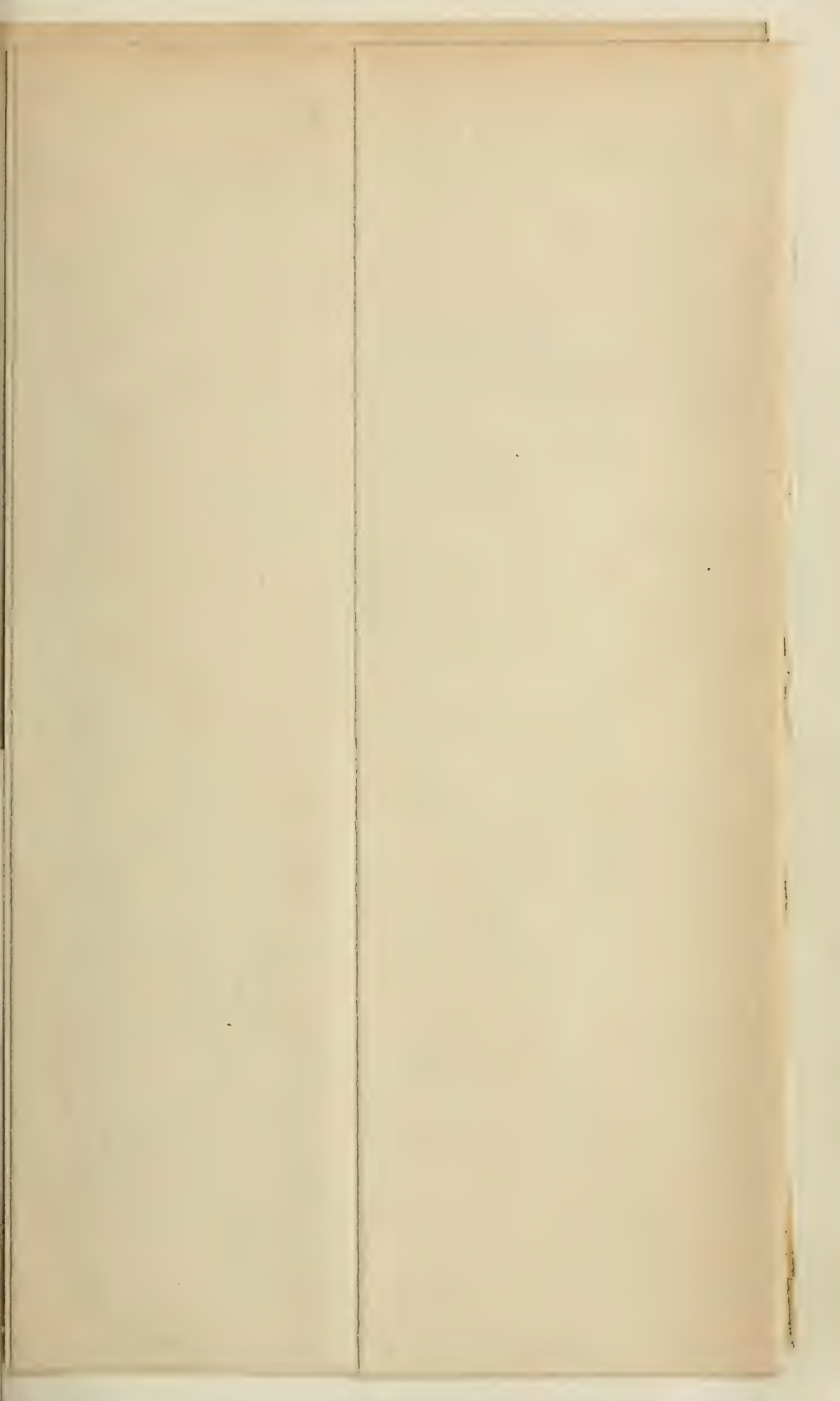
To the east of the 54th and 55th miles lies a spruce and balsam valley, succeeded at the 55th to 56th mile by a muskeg area. Between the 56th and 59th mile the land is generally more rolling and better timbered with small wood—tamarac, jackpine, spruce, poplar and birch.

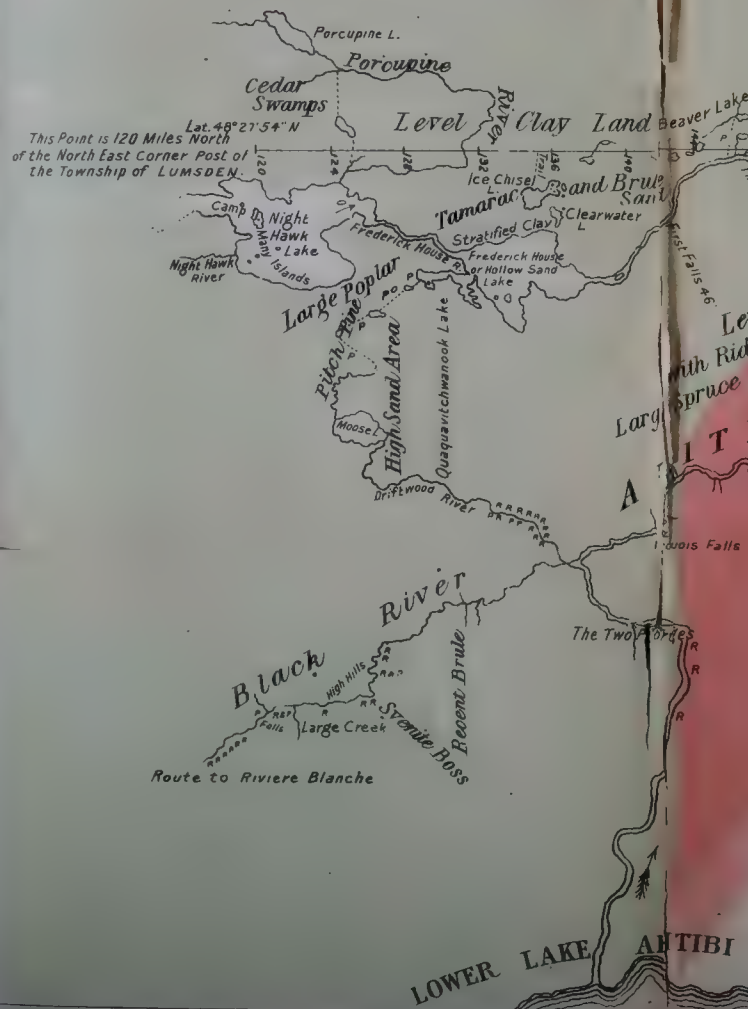
Mattawan River to Height of Land.

The Mattawan river, crossed between the 59th and 60th mile, is deep, crooked and somewhat difficult for canoe navigation. It traverses a wide valley and expands at short intervals into small lakes. Large jackfish were caught in its waters. The river narrows, two miles above our crossing point, into a little unnavigable stream. Both banks are well timbered, chiefly tamarac and with tamarac and jackpine. Considerable tamarac was noted in this section which would make five or six good ties per tree. The river empties into the Montreal three miles to the east.

Between the 60th and 64th mile the land rises to a higher level, the hills sloping generally to the southeast. From 64th to the 67th mile comparatively level areas extend on both sides of the line, and it was evident that we were crossing the height of land. From the 67th to the 70th mile is a rolling stretch of muskegs and ridges, timbered chiefly with tamarac and spruce in the lowlands and with jackpine, birch and poplar on the ridges. Underneath the white sand the rock is a gray gneiss.

A small lake with much sand beach was crossed at the 70th mile. A navigable stream enters at the eastern end from the northeast, another from the south at the southwest, while the outlet flows northwest from the western end. Two miles beyond, at the 72nd mile, the line crosses between two large ranges of hills,





DISTRICT

Large White Spruce Birch Balsam & Balm of Gilead

DISTRICT

- LAURENTIAN, Grey and Pink Gneiss
- HURONIAN, Gabbro, Diorite, Altered Diabase, Quartzose, Mica and Hydromica Schists.
- DEVONIAN, Dolomites, Limestones, Shales



RIVER
OF ALGOMA

OF NIPISSING

MAP OF
ABITIBI RIVER
AND THE
NIPISSING-ALGOMA LINE
1898.

Scale 8 Miles to an Inch.

THE COPY, CLARK & CO. LIMITED LITHO. TORONTO.



Abitibi Canon, looking south from level of River

Parks



Abitibi Canon, looking south from bank of the River

Parks





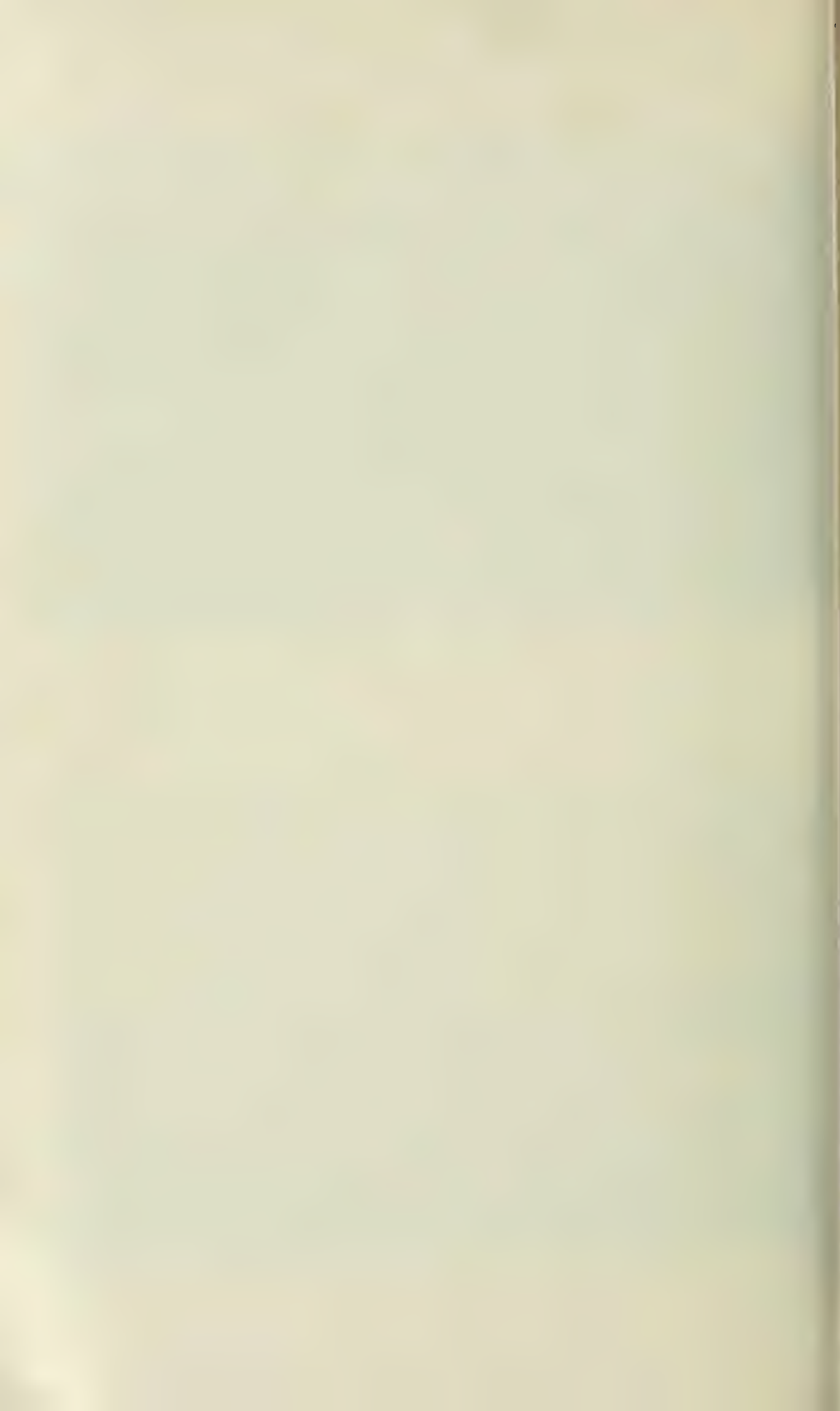
New Post (H. B. Co.) on Abitibi River

PARKS



Indian Camp at New Post, Abitibi River

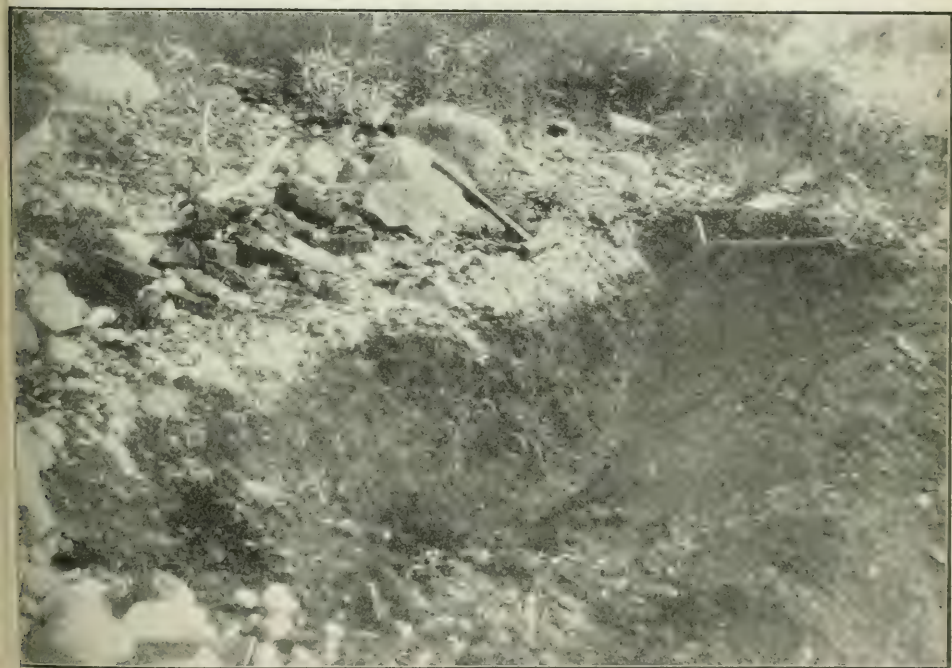
- Parks





Camp on lower reach of Abitibi River

Parks



Lignite deposit on Abitibi River

Parks.





The Bishop of Moosonees Cathedral at Moose Factory

— Parks



"Bishopscourt" at Moose Factory.

Parks.



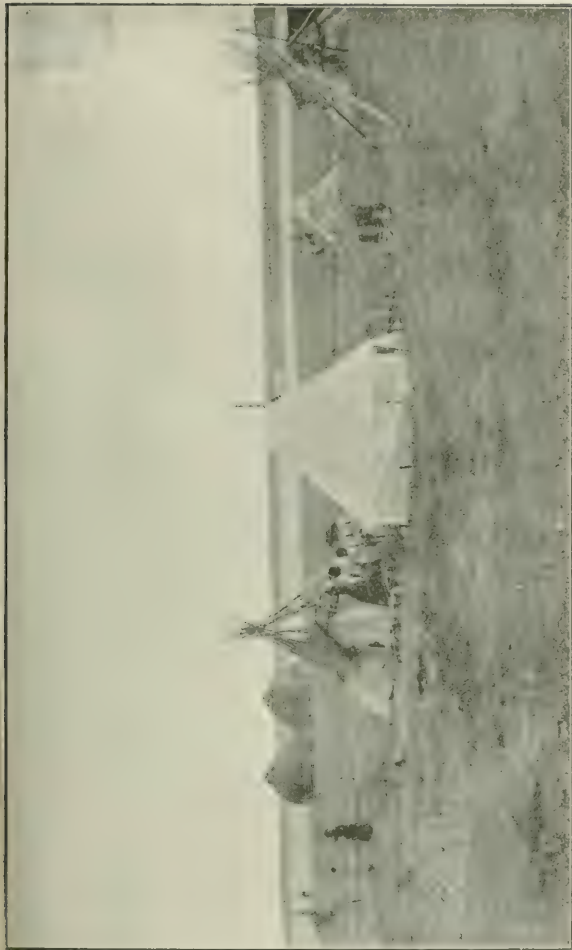
Chief Factor's Residence (H. B. Co.) at Moose Factory.

-Parks.



H. B. Co. Employees' Family at Moose Factory

-Parks.



Indian Camp on Moose Island

Parks



Moose Island, showing H. B. Co. Buildings of Moose Factory

Pages



those on the west sloping to the northwest and those on the east to the northeast. We followed the outlet of the lake at the 70th mile for some four or five miles of its course, passing through much marsh land with small tamarac and spruce on the sides. Several cuttings along the stream indicated that it was a travelled route. Five miles from its source it turns abruptly to the west and we concluded that it probably emptied into the Michipicoton waters. Rock exposures along the bank were all gray granite-gneiss, with some darker exposures fused into the former and well impregnated with iron. Returning to the lake, the feeder at the northeast was visited. This flows from a little lake about a mile and a half east of the 71st mile. Its course is entirely through low marshy lands with poor timber. To the east extends an area of muskeg and swamp. Two beaver dams were crossed. Beyond the lake to the east of the 71st mile the country north and east rises to a level sand plain crossed by a portage two and a half miles long to a tributary of Prairie Bee lake. Windermere Indians come in this way to hunt. The river end of the portage is just three miles east of the 73rd mile, and the country between is a rolling stretch of plain and muskeg. In the low marsh areas ground-cranberries were found, the first we had seen in quantity. Paddling down the river we passed through a low-lying region partly timbered with small spruce and jackpine.

High, bare, rocky bluffs line the shores of Prairie Bee lake to the south, southeast and southwest. On the north the hills are covered with a mantle of sand and are well-wooded, chiefly with poplar and birch. Entering Windermere lake we traversed several of its bays, and climbed some of its highest bluffs, the whole country around its shores presenting a uniform appearance—birch and poplar timber, bare hills of gneiss and sand beaches.

Several families of Indians live at the lake, fishing and cultivating little gardens. Whitefish, lake trout and jackfish are plentiful in Windermere waters. The outlet, called by the Indians "Bad river," is for miles a succession of falls and rapids. It is not a much travelled route and

Prairie Bee
and Windermere
lakes.

An Indian
settlement.

we had to cut our portages, which were numerous. It flows northwest until within two or three miles of Dalton, where it turns southwest, being joined at this point by the Missanabie and Dalton stream, and emptying into Michipicoton waters. Another water-way reaches from lake Windermere to Dalton, north of the C. P. R. track, but this is as bad as the first. A good canoe route extends south of the track from Windermere to Chapleau.

The Batchawana River Region.

Three days after leaving Mr. Speight's party at Sudbury we arrived at Batchawana bay and began our trip up the Chippewa river at once. Our camp for the night was at the foot of the lowest falls on the river, where the descent is about 75 feet, with a portage of half a mile on the left or north bank. At the upper end of the portage is a hard greenish rock of felsitic texture, which forms a natural damway where it crosses the river, so that the water of the stream could be backed here at very little expense and a strong power secured. Near the foot of the portage a trail was noticed rising from each bank of the river. This leads from Batchawana to the Government road which stretches from Sault Ste. Marie in this direction. The people of Batchawana hope that the road will soon be extended to their settlement and the rivers Chippewa and Batchawana bridged.

Up the Chippewa clay banks were frequently met with. High bluffs extend on the left side, but on the right is no mean stretch of river flats, well timbered with hardwood. These flats, if cleared, would make fine agricultural and pasture lands. Their cost and the labor expended in clearing might be more than repaid by the sale of hardwood, especially to winter camps.

Agricultural
and Pasture
lands.

Hardwood
and Pine.

North of the Chippewa.

Finding the Chippewa shallow and hard to ascend, we left it after a day and a half, on Thursday, October 6, and portaged inland north 5 degrees, east a mile and a quarter to Little lake. The country passed was a fine stretch of hardwood with scattered white pine, not large but solid and

thrifty on the ridges and in the valleys. The slopes and ridges were well covered with a good sandy loam, intermixed with organic matter. Lake No. 1 lies about 200 feet higher than the Chippewa at the point where we left the river. We paddled three-quarters of a mile north and again portaged, going one mile north, 20 degrees east, to lake No. 2, travelling up a ravine between hills of gray granite gneiss. Considerable white pine was noted on the ridges passed and around lake No. 2. Crossing a little height of land we came to an old Indian camping ground and an extensive sugar bush. Years ago

An old Indian Sugar bush.

this country was well inhabited, but for some reason the game left or was driven out and is only now returning. From the old sugar bush we paddled across a little low-lying lake with pine upon its shores, and portaged into lake No. 4, a lake of legendary fame, whose tale our guide related as we paddled northwest a mile and a half on its waters. Large rocky bluffs line the shores, and a good deal of pine was observed.

North a mile and a half of lake No. 4 an area of green schistose rock was seen about

Green Schists.

half a mile in width, and striking west 20 degrees north we passed this in the low lying grounds of a former lake basin. Continuing half a mile north through good hardwood bush, maple and black birch, we came to another little lake, and having portaged from it 13 chains over a little height of land we entered the first lake, of the Batchawana system. The lakes of this system are easily distinguishable from those of the Chippewa by reason of the waters of the first named being dark and brownish colored, while those of the latter are clear as crystal. Speckled trout are found in nearly all the lakes. At lakes 6 and 7 we saw no pine. Going northeast up stream from lake No. 7 we came to a recently burned area

A Region of Lakes and Marshes.

which extended along our course for some miles. We now passed through a series of marshy lakes and streams of shallow water with much muck bottom. Many little portages were made and scattered areas of white pine noted. Small spruce, tamarac and balsam grew around the waterway. Turning to the southeast we again entered Chippewa waters. Numerous

wolf trails were seen round one of the streams.

To the east stretch a level plain, partly open and covered with dry mosses and a good growth of short coarse grass. Crossing a mile and a half of this open we came to a little stream and one-half mile farther to a heart-shape lake the shores of which were thickly wooded with small white pine.

Around Lake Chippewa.

After portaging we entered lake Chippewa, and here camped for three days, October 8 to 11, spending this time in exploring the country to the east and southeast of lake Chippewa. The whole of this district is well covered with hardwood, with scattered pine throughout and belts of pine around the lakes and in the valleys. An area of slate and diabase crosses lake Chippewa, striking north 40 degrees east. Three miles south of the

same lake a diabase dike was crossed, and in the same vicinity quartz with magnetite and green schist walls. Samples from a quartz vein yielded traces of gold upon assaying. To the west of lake Chippewa hardwood ridges with little pine extend to the Batchawana river. North of the lake is a series of little lakes most of which are tributary to the Batchawana. To the east of these lakes is a pinery stretching to and beyond the Chippewa river.

From a high bluff at the southwest end of Wart lake the country north, south and east could be seen for miles. To the southwest, south and southeast lay a country of hardwood hills and plains, ridges and valleys of pine, and extending, our guide said, through to the banks of the Goulais. But beyond Wart lake to the north and northeast a rough country was distinguishable, a great succession of bluffs, some timbered with spruce, but being for the most part bare rock,—the whole having the same appearance as the country crossed by our meridian line in this latitude. Gray granite bluffs surround the south and west shores of Wart lake rising in places to an altitude of 350 or 400 feet.

The Batchawana Valley.

West of Chippewa lake the Batchawana river is wide and shallow. The bed is covered with large boulders and paddling in a birch canoe is slow work. Going down the

The Batchawana Valley.

West of Chippewa lake the Batchawana river is wide and shallow. The bed is covered with large boulders and paddling in a birch canoe is slow work. Going down the

river Mr. Kennedy and I walked the banks while our guide brought down the canoe with the packs, he being in the water much of the time. After a day of this work we were able to do more paddling, the water being deeper and the stones in the bed smaller. Numerous stretches of gravel and sand were passed and along the sands of the river-side grew choke- and ground-cherries. Many wolf tracks were noticed.

This river must rise at least four feet above its autumn height in the spring-time, and then its waters come down with great force, as was evidenced by the presence of large stones which had been carried in among the bushes of banks three or four feet high.

Two series of falls were passed and portages made, going down the river. Logs would probably pass over the first fall easily enough in high water, but the rocks of the second would require some blasting for driving. A hornblende schist extending southwest was noted in contact with the granite-gneiss at the first falls.

We left the Batchawana river a few miles from its mouth and portaged two miles westerly into Pike lake, and from there two and one half miles to lake Superior.

High bluffs of gray granitic rocks lay to the northwest of our portage into Pike lake. Iron and copper were found here, our guide said, more than thirty years ago. From Pike lake a trail of a quarter of a mile leads to an old road extending from lake Superior back four miles to a bed of iron ore. This

road was graded and the ties laid more than twenty-five years ago, and much of it is now grass-covered.

No ore was ever taken out over it, and at Batchawana I could not learn why operations had ceased at such a stage. The road passes through a country comparatively level,—sand loam and gravel, thickly timbered with hardwood and spruce. Much of this land would be suitable for agriculture.

All the level front of Batchawana bay has been taken up for settlement. Some of the settlers are reaching back inland. Apple trees in the district bore and ripened fruit this year, but the crop is comparatively rare. Batchawana is one of the best fishing stations on lake Super-

ior, and its front is well lined with a fleet of fishing boats. The steamer Telegram does a busy carrying trade throughout the season, its owners buying all the fish taken along the Canadian shore from Sault St. Marie to Otter Head. Three lumbering firms are operating in this district this season, two taking out pulpwood and one cedar. Altogether 500 men or more will be employed for the winter.

The large island in Batchawana bay is for the most part comparatively level land, is well wooded, and would make good farming or ranching land if cleared.

Eight miles below Batchawana, near the mouth of the Chippewa river, is a copper prospect upon which considerable blasting was done in 1897.

The business atmosphere of Batchawana is healthy and invigorating—lumbering, fishing, farming, with not unpromising prospects of development in iron and copper.

Economic Minerals of the Line.

At Garden River I was shown samples of nickel and iron ore said to have been taken from rocky bluffs in the country to the northeast. At Goulais river there is a gold and silver prospect, already mentioned in this report. Mineralized belts were crossed in this locality and up to the 12th mile. Of the country from the 16th to the 23rd mile the rock formation is very hard and in places flint-like, and not likely to prove good prospecting ground. Extensive slate areas of dull gray color were passed here. Quartz veins, carrying at the surface iron and copper pyrites, were passed in the country east and west of the 26th to the 30th mile.

A number of veins were crossed in the country along the 36th to the 43rd mile. Sample taken from a large quartz vein with schists assayed 7 oz. silver and traces of gold. The rocks to the east of the line were heavily impregnated with iron. Schists and diabase dikes cutting northwest through the granite were numerous here. This I believe is the most promising region for prospecting along the meridian line. It is four days' journey by water from Chapleau, and five or six from Batchawana.

In the Laurentian area north of the 45th mile little or nothing was found, if the talc and mica schists of Bad river be excepted.

In the region of the Batchawana and Chipewa rivers were numerous indications of both

copper and iron. A dull lead-blue slate was found on the shores of lake Chipewa. A quartz vein south of the lake yielded traces of gold. Magnetite and quartz associated were found in this vicinity.

Copper and
Magnetite.

CORUNDUM AND OTHER MINERALS.

By Willet G. Miller

Introduction.

FIELD WORK on the Economic Geology of Eastern Ontario was carried on during the summer of 1898 on lines similar to those followed in 1897.¹ It was at first proposed to complete the work in connection with the outlining of the area over which the corundum deposits occur, and after this was done to spend some time in studying the deposits of iron and other substances which have been attracting considerable attention in this part of the Province during the last few years. As the work progressed, however, the corundum-bearing rocks were found to cover such an extensive area that little time could be devoted to the deposits of other minerals.

My assistants, as in 1897, were Messrs. R. T. Hodgson and W. C. Rogers, whom I have to thank for the interest they showed in the work.

The Director of the Bureau of Mines spent the last week of September in the district, and I accompanied him in a visit to some of the chief corundum deposits.

During the past season, as in 1897, we received many favors at the hands of persons living in the district, and I desire to return thanks for the assistance which was so willingly given us during the progress of the work.

The Corundum Areas.

Our work in 1897 showed that corundum occurred at places over an area of about 50,000 acres, lying partly in the northern portion of Hastings and partly in the adjoining county of Renfrew.

The length of the belt or strip of country in which we found the mineral in that year was about 30 miles. It was known, however, as stated in my last year's report and as shown on the index map which accompanied it, that rocks similar in character to those in which

we found corundum in this belt outcrop to the south and southwest. I also stated that it was likely the mineral would be found to occur in place in this part of the district. These rocks, among which are the first outcrops of nepheline syenite discovered in the Province, had been studied pretty closely in some respects, but it seemed to me likely corundum would be found to occur in certain facies of them to which little attention

had been paid by the geologists who examined the district. Our In Nepheline Syenite and Anorthosite work during the past season has verified this prediction, as we found corundum in place at a number of points in Duncannon and other townships in which the remarkable masses of nepheline syenite have for some years been known to exist.

A very interesting occurrence of corundum was discovered in the townships of South Sherbrooke and Oso, where the mineral was found in a basic anorthosite. The similarity of this mode of occurrence of the mineral to some of those of Russia and India will be referred to again.

The past season's work has shown that corundum is to be found at intervals along a belt

of rocks which runs for a distance of about 75 miles from the township of South Algona in the northeast to the township of Glamorgan in the southwest. In addition to this there are two bands of corundum-bearing rocks of lesser length which have not as yet been connected with the main belt. One of these belts, which has a length of about eight miles, runs from the township of Methuen in Peterborough county through a corner of the adjoining township of Burleigh to Stony lake. Another belt, which so far as examined is found to have a length of 10 to 12 miles, runs from the western part of the township of South Sherbrooke in Lanark county through the township of Oso southwestward into Olden and Hinchinbrooke in Frontenac county.

¹ Part III, Seventh Report of the Bureau of Mines.

The locations of these different areas of the corundum-bearing rocks are shown on the index map which accompanies this report (p. 198). It will be seen that the smaller belts are separated by a considerable distance from the larger belts, and that the three belts taken together partly surround a large district.

As stated in last year's report, the corundum occurs as a primary constituent in a series of rocks which may be classed broadly as syenite. Numerous varieties of syenite are met with in this field, both as regards size of grain and constituent minerals. In some cases the

reference is made to the chief characteristics of the rock in different parts of the field.

Peterborough and Haliburton.

The past season's work was begun in July in the county of Peterborough. I had paid a hurried visit to this township at the end of the season of 1897, but time did not permit me to determine the area over which the corundum-bearing rocks occur.

Townships of Methuen and Burleigh.

The mineral was first found in the township of Methuen in some deposits which were being worked for mica, and its occurrence here

REPORT OF
W. G. MILLER
1896

INDEX MAP OF CORUNDUM DISTRICT.



rock consists almost entirely of acidic felspar, pink or white in color. In other cases nepheline, mica, hornblende or corundum is present. Corundum also occurs in a locality discovered in 1898 in a rock which may be classed as a basic anorthosite. The corundum-bearing rocks often occur as dikes which cut through the overlying gneisses. At other times these rocks have the form of large masses which in some cases appear to shade off into granite. In the following pages

was made public shortly after the mineral was reported to occur in Carlow, where it was found by Mr. W. F. Ferrier in October, 1896. In my hurried visit to the locality in 1897 I determined that the rocks in which the mineral here occurred were similar in character to those in which we had found it in Carlow and other townships, although the mineral itself was considerably different in color from other specimens of it which we had seen in the region.

On beginning our work in Methuen last summer we pitched our tents on the property known as the Bennett mine. It was on this property the corundum was first found in the township. The main buildings in connection with the property are located at the edge of a small lake, known as Mountain lake, and they are at the foot of a range of hills known locally as the Blue mountains. These hills, following the general direction of the strike of the rocks, run in a northeast and southwest direction and have a length of five or six miles. The Bennett property is situated near their western end. This part of Methuen is one of the most rocky and barren areas from the agricultural point of view which I have visited in the district. Rock is exposed at the surface over a large area, and many of the hollows are occupied by beaver meadows and small lakes. Five lakes can be seen from one point at the eastern end of the Blue mountains.

The map of Methuen, made from the survey of 1822-3, is one of the poorest and most inaccurate of any of the township maps which I have tried to use. The larger lakes are unrecognizable, and in most cases it is impossible to determine the boundaries of lots. In stating the locations of points in this township I wish it to be understood that in most cases I had no survey lines to go by, and could not make use of the inaccurate topographical features laid down on the map. The location of the lots and points referred to were determined as nearly as possible from information obtained from some of the older settlers, and from a few lines which have been run during late years by persons interested in mining claims.

The Bennett mining location, on which considerable work has been done in mining mica, comprises lots 14 in concessions nine and ten. The main buildings are situated on the former lot and are on the north side of Mountain lake. The line between lots 13 and 14 runs across the southwest corner of the lake. Little Mountain lake, which is a short distance west of Mountain lake and in the same depression, lies wholly in lot 13 of the ninth

The Region
of the Blue
Mountains.

The Map of
Methuen.

Bennett and
Miller
Locations.

concession. The Miller location, across Mountain lake opposite to Bennett's, embraces the southeast 50 acres of lot 13 in the same concession and the northeast 25 acres of lot 12 in the ninth.

Work has been done at Bennett's near the shore of Mountain lake on the narrow strip of land which lies between the edge of the lake and the base of the hill or mountain, and also near the top of the hill some distance farther west. Where the work has been done at the base of the hill the country rock is a dark gneiss, which is composed for the most part of plagioclase and hornblende, together with some mica. Through this gneiss there are several dikes which cut it in different directions, but have a general trend at right angles to the adjacent shore of the lake and the base of the mountain. These dikes are similar in appearance to ordinary acid pegmatites, but are composed essentially of pink or light colored feldspar and mica, both light colored and dark. There appears to be no primary quartz present in them. It is these dikes which have been worked for light colored mica. The dikes may be classed as syenite-pegmatite. Between the foot of the hill and the dark gneiss there is a rather deep ditch-like depression along the contact. The rock on this face of the hill and for some distance over the top is for the most part rather fine grained and light in color, but in places it contains grains and stringers of nepheline which is usually in coarser grains than the mass of the rock. In places the rock also contains abundant and often well formed octahedrons of magnetite.² The

² A typical specimen of this rock of the Blue mountains, in which nepheline was not observed in hand specimens and which contained less magnetite than some parts of the mass, was analyzed by the writer and found to have the following chemical composition, which shows it to be a nepheline syenite:

Si O ₂	58.27
Al ₂ O ₃	23.75
*Fe ₂ O ₃	1.86
Mg O	trace
Ca O	1.89
K ₂ O	5.17
Na ₂ O	6.90
Loss on ignition	2.30
Total	100.14

Sp. gravity=2.60.
*Fe O is estimated as Fe₂ O₃.

coarse dikes cutting through the gneiss, which have been referred to, are somewhat similar in composition to the mass of the rock in the hill, with the exception that those at Bennett's apparently do not contain nepheline. Some of the coarse dikes and parts of the main mass of the hill carry corundum. The dikes cutting the dark gneiss near the lake shore run towards the mass, but cannot be seen to run into it. It is evident from the similarity in composition of the dikes and the mass of the rock in the hill that the material of which they are composed has been derived from the same source. Some of the dikes on the Miller property, which has already been referred to, and which are similar to those at Bennett's, have been worked for mica and contain corundum and nepheline; so that it would seem that these coarse dikes which cut the dark gneiss on both properties are composed of material of similar origin to that of the finer grained mass of syenite in the mountain.

As has already been stated, the greater part of the rock in the Blue mountains, which run across country here for five or six miles, is composed of a light colored rock which may be called in general syenite, and which contains in places more or less corundum and nepheline. On the northern side of the hill the syenite seems to merge off into granite. Between the part of the hill on which the Bennett property is situated and the buildings of the Miller property, situated about one mile to the south, there is a depression which for a distance across it is occupied by Mountain lake and nearer the Miller buildings by a swamp. This depression runs for some distance parallel with the hill and, as stated, both Mountain lake and Little Mountain lake with the outlet of the latter lie in it. For some distance to the east of Mountain lake the depression is occupied by swampy ground. The rock which outcrops in this depression, on the borders of which is situated the buildings of both the Bennett and Miller properties, is chiefly the dark gneiss to which reference has already been made. This gneiss is bounded to the north by the syenite of the ridge known as the Blue mountains, and to the south by a thin strip of pink

micaceous syenite which passes over into a granite of similar general appearance. At the Miller mine however there is a narrow strip of lighter granite near the syenite before the pink granite comes in. Although the syenite and granite are so similar in appearance, and hence seem to be products of one magma, still along the line separating the typical granite from the typical syenite there is a narrow swampy depression. At the Miller mine the office is situated on one edge of this swampy ground.

The general geological structure of this part of the field can then be described as consisting of a basin-like depression lying between the foot of the Blue mountains, where the Bennett buildings are located, and the vicinity of the buildings at the Miller mine. This depression or trough is occupied chiefly by a dark gneiss with which is associated, further to the east, some crystalline limestone. Outcropping on either side of this trough of gneiss we have syenite which both to the north and south, across the strike, seems to pass into granite. The gneiss in this trough would then seem to be a part of a synclinal fold of a layer of material which before being denuded probably covered the Blue mountains to the north and the syenite and granite to the south of the lake. Since the syenite outcrops on both sides of the trough of gneiss it would seem that this rock is continuous under the gneiss, and the gneiss may thus be considered to occupy a depression in the mass of syenite. The dikes of syenite in the gneiss, which have been referred to as having been worked for mica, may be considered as representing material which was shot through the gneiss at the time the igneous mass represented by the syenite was in a state of fusion.

There are many areas of different sizes of the older gneisses and crystalline limestone isolated from one another overlying igneous rocks,—granites, syenites and basic members of the series—in this region. These areas represent for the most part what has been called the Grenville series, while the igneous rocks over which they lie or which have cut through them represent what is known as the Fundamental gneiss. The Grenville series in some parts

Rocks of
the Blue
Mountains.

Grenville
Series and
Fundamen-
tal Gneiss.

of the region covers large areas, while in other places it is represented by small patches here and there which occupy hollows or other protected areas over the surface of the Fundamental gneiss, showing that at one time this latter group has probably been entirely covered by the Grenville, which has now been removed with the exception of the patches here and there which have been protected from denudation. These areas of Grenville over the Fundamental gneiss possess a similar arrangement to the outliers of Potsdam and later formations of the Palæozoic which are found in places in the region overlying the different members of the crystalline series.

There are rocks of three ages usually associated with the outcrops of corundum. The oldest of these is a dark gneiss which is pretty uniform in character throughout the district. This can be seen to be cut through by the different varieties of syenite in which occurs the corundum. Then both the gneiss and the corundum-bearing series are cut through at times by dikes of coarse quartziferous pegmatite. This structure is seen in the township of Methuen, which we now have under consideration.

The most striking topographical feature of Methuen is the range of hills known as the Blue mountains, to which reference has already been made. This range runs from about lot 22 in the sixth concession to about lot 14 in the eleventh, which forms its western end. The southern face and greater part of the range is composed of syenite. This face rises abruptly from out the gneiss, the line of contact between the two rocks being occupied for a considerable distance along the range by a deep ditch-like depression. The top of the range for the most part is comparatively free from brush and fallen timber, which have been removed by fires at different times. From the north face of the range there stretches out a low lying tract of country which contains little timber and is occupied by rocky knolls and ridges, composed for the most part of pink granite, between which lie innumerable marshy hollows. At places over this granite area are small patches or outliers

of gneiss and crystalline limestone. At the western termination of the range of hills there are a number of coarse quartziferous pegmatite dikes cutting through the gneiss. There is one particularly large dike of this character in the vicinity of Jack's creek, about a mile to the northwest of the end of the ridge.

To the south of the edge of the syenite on the Miller property the country is also underlain by a granite somewhat similar in appearance to that to the north of the ridge. This area of granite occupies most of the shores and islands of Koshkabogamog lake. On some of the islands and adjacent parts of the shore the granite takes on a distinctly porphyritic structure.

Granite of similar character shows in the area at the eastern end of Stony lake. It outcrops along the southeast shore of Jack's lake and some miles farther east along the North river. In fact the granite may be said to be the most abundant rock in this part of the township. Through this runs the Blue mountains, which are composed for the most part of syenite. From the western end of the range the syenite runs at a lower altitude to the shores of Stony lake. Over this lie areas of the gneiss and crystalline limestone.

In addition to the areas just referred to, we discovered an outlier of rock of Lower Palæozoic age. This outlier belongs to the Potsdam formation. It has a diameter of about one mile, and runs from a little south of the Miller property to near the end of the southwest arm, known as Stony Lake bay of Koshkabogamog lake. This area of Potsdam presents a level surface which at once attracts one's attention on going in on the road which runs from the eastern end of Stony lake to the Miller mine. Not a great distance from the mine the road passes over a corner of the area. The vegetation on this Potsdam is also somewhat different from that of the surrounding Laurentian, and has caused the settlers to give to it the name the Oak Ridge. The Potsdam here has no great thickness, standing up not much above the surface of the Archæan.

Rocks of three Ages.

Syenites of the Blue Mountains.

Granite of the Range.

An Outlier of Potsdam.

The reason for this area having been preserved is quite evident when we examine the topography of the surrounding country. To the north there is the ridge of the Blue mountains, while to the south of the outlier, in the vicinity of the southwestern arm of Koshkabogamog lake, there are hills of granite. The area of Potsdam thus occupies a part of the trough-like depression between two tracts of high ground. It has thus been protected to some extent from denudation and prevented from being worn away as have other areas of Palæozoic rocks which at one time no doubt covered a considerable part of the surface of the township.

Lithologically the Potsdam rock which outcrops here in Methuen may be said to be made up of rather coarse pebbles of quartz and finer material of a similar composition.

Outliers of Potsdam occur at other points along the southern border of the Laurentian protaxis in the Province, but so far as the writer is aware this outlier in Methuen is many miles distant from any others of similar age which have been reported.

In this Potsdam conglomerate some concretions were observed similar to those known to occur in areas much farther to the east.

Limestone of Black River age lies on both sides of Stony lake, some distance from its eastern end. It may be seen in place not far from Crow's landing on the south side of the lake and north of Julian's landing on the north shore.

It may also be added that an area of Potsdam appears to be in place along a part of the shore just south and east of Crow's landing. A number of boulders were found not far from the edge of the lake, but as much of the rock along the cliff is covered by loose material we did not succeed in finding an exposure. On the road about one mile south of Crow's the Silurian limestone rises into hills. The lower beds of this limestone in places contain pebbles of considerable size.

Corundum was first discovered in Methuen, as has been stated, in working a dike for mica.

This was in one of the pits on the top of the Blue mountains on lot 14 in the tenth concession. At the surface of the ground no corun-

dum was apparently observed, but on blasting into the rock the mineral appeared. On working down from the surface it became more abundant. In most of the dikes from which corundum has been blasted out the mineral is for the most part found as a core in the masses of mica. The corundum is often not observable in the mica until the latter is broken open, when it is found forming the centre or core of the mass. The rounded surface of the corundum and other characteristics leads to the belief that the masses of light colored mica are secondary products after the corundum. The relations of the two minerals are shown in Fig. 1. It might be added that the corundum shows a tendency to be segregated along the edge of the dike, and that as the mining proceeds to greater depths the mineral becomes more abundant at the expense of the mica.

In addition to the light colored mica, most of the dikes contain a dark variety which has a green appearance in thin layers. No corundum is found in the dark mica. The two kinds of mica in these dikes seem to have different origins. The light colored is apparently derived from corundum by the alteration of this mineral, while the dark colored variety appears to be an original constituent of the rock. Some of the light colored varieties have a purplish tint in thin layers in transmitted light.

There is another mode of occurrence of the corundum in which the mineral is found as the centre of ball- or nodular-like forms in the mass of certain varieties of the fine grained rock. These nodular masses in the rock are quite striking in appearance. The inner parts of them, surrounding the corundum, are composed of rather fine grained white felspar, which is surrounded by a mixture of the same felspar and dark mica. An occurrence of this kind is seen a short distance off the road to the Bennett mine, on lot 15 in the ninth concession, known as the Madill property. Some blasting has been done here. A reproduction from a photograph of one of these nodules is shown in Fig. 2, which accompanies this report.

The nodules are tough and difficult to break with the hammer, and the photograph shows the corundum to have a somewhat radiated structure.

Different minerals of apparently secondary origin are found associated with the corundum, but a unique specimen was obtained from the outcrop to which reference has just been made. This specimen consisted of mica, feldspar and corundum, together with a mass of galena an inch or so in diameter. This is the first specimen of galena that the writer has seen in connection with these rocks during the two seasons of field work. Pyrites however is frequently found in the corundum-bearing series in Carlow.

Corundum occurs in a third way in Methuen. In this case the mineral is found in grains, masses or crystals scattered through the mass of the syenite, and is not enclosed in masses of mica nor in the centres of nodular masses of differentiated rock. This third mode of occurrence is similar to that described in last season's report in connection with the deposits in North Hastings and South Renfrew. It may be stated however that well formed crystals are not nearly so common in Methuen as in the other districts, and moreover there is considerable variety in the occurrence of the mineral in the mass of the rock in this township. One of these is that in which the mineral occurs in small mica-like flakes with a bronze lustre on weathered surfaces. At first sight the mineral does not appear to be corundum. An outcrop of this character occurs on the Bennett property, on the top of the ridge north of the shore of Little Mountain lake and to the west of the main buildings. It is situated a little to the southwest of the blacksmith shop on the top of the ridge.

The Blue mountains, as has been stated, extend in a southwest direction from lot 22 in the sixth concession on their northeast end to a little west of the Bennett property, lots 14 in the ninth and tenth concessions. Near its northeast end the ridge has a breadth of about one mile, extending southward to within one-half mile of Koshkabogamog lake. Grassy lake occupies a hollow in the ridge near its eastern end. Throughout its whole length the ridge

is composed for the most part of syenite, which seems to merge off into granite on the north. Corundum and nepheline appear at places in the syenite. The nepheline occurs at times in vein- or stringer-like forms through the rock. At other times it occurs in large masses in the comparatively fine grained syenite. Some of these masses, which generally have a rounded surface, have a diameter of a foot. Such masses of the mineral often occur isolated from one another. In addition to the dikes which have been opened up on the Bennett property, there are others near the southern face of the ridge at two or three points to the east of this. In several cases the rock has been blasted out in the search for mica.

The fine grained syenite which was referred to as outcropping near the buildings on the Miller property has a strike in the same general direction as that of the ridge of Blue mountains which lies about a mile to the north. This syenite of the Miller property consists of pink feldspar and dark mica, and contains the characteristic small octahedrons of magnetite which have been spoken of as occurring in the syenite of the Blue mountains. From the buildings on the Miller property this band of syenite runs eastward and crosses the northwestern arm of Koshkabogamog lake, which here forms a narrow bay about 300 yards from its end. At the points where the syenite comes in contact with granite on the shores of this arm the contact is marked by two small bays on opposite sides of the larger bay or arm.

As has been already stated, there are coarse dikes of syenite which cut the dark gneiss in the vicinity of the buildings on the Miller property and which outcrop near the contact of the fine grained syenite and the granite. Two or three of these dikes contain corundum, in addition to the mica for which they have been worked. One of them lying the farthest east of those which have been worked carries in places a high percentage of nepheline. In one of the larger dikes there are a number of secondary minerals, among which were noticed quartz, occurring in geodes and stringers, tourmaline of a black or in some cases bluish color, calcite, pyrite, marcasite and chalcedony.

From the end of the Blue mountains, near the western side of the Bennett property, the syenite rocks, carrying corundum in places, run southwestward at an altitude similar to that of the surrounding country to the north shore of Stony lake, and are continued on to a small island not far from the shore. This island belonged to the late Mr Craig, M.P.P., of Fergus, and there is erected on it a summer cottage. This cottage is nearer the east end of the lake than are any of the other numerous cottages which are situated on the shores and islands of this pleasant summer resort. The strike of the rocks changes near the shore of the lake, and runs in a more nearly east and west direction through the islands of the lake than does that of the rocks to the northeast.

The island, which is composed for the most part of syenite, lies two or three hundred yards to the southwest of a point on the shore which is also composed of syenite. The small islands along the shore a little to the east are composed of fine grained pink or grayish granite. On the point itself there are two or three dikes which carry a little corundum. The island has a breadth of 75 or 100 yards, and on its northwest side there is a small band of dark gneiss about ten yards wide. There are also some narrow bands of this rock in places through the syenite. Some dikes of quartziferous pegmatite cut through the syenite on the island. The height and breadth of the island are greater on the east, and it narrows down towards the west.

Syenite of two colors, pink and white, occurs on the island, and these two varieties are quite sharply separated from each other. The white syenite runs through the centre of the island, and is bordered on both sides by the pink variety. The white variety has a width of about twenty-five feet. The white syenite can be seen as a white streak on the island for some distance from the northeast on the main shore, as it stands out so distinctly from the pink on its edges. About ten yards from the northwest corner of the cottage, down the face of the hill of the island, there is a segregation of bluish and grayish corundum in pink syenite. The largest of the pieces of corundum showing here has a diameter of between three and four inches.

Corundum is also scattered in places on the island through the white fine grained syenite. Six or eight yards from the front door of the cottage nepheline shows in patches in the white rock. The individuals have a length of one or two inches. This island contains in small compass what may be called a synopsis of the geology of the corundum-bearing rocks and of the rocks which are commonly associated with these in the district. It lies in the tenth concession of the township of Burleigh.

On the main shore, a hundred yards or so to the west of the island, crystalline limestone is in place. The strike is about N. 30° E., and the dip is about 60° to the southeastward. This limestone is rather fine grained and close in structure. It is somewhat impure and is dark gray in color.

About one mile west of the island, along the main shore, there is a quarry of biotite granite, and further west down the lake there is another granite quarry which was opened years ago on Eagle island. Granite from this quarry has been shipped to Toronto and other places as a road material.

Coming down the channel on the south side of the lake and near the east end the passage is seen to lie along the contact between two series of rocks. The islands on the north of the channel are composed for the most part of granite, while the shore of the mainland is composed of schistose rock, some of which appears to be impure crystalline dolomitic limestone. The strike is here N. 70° or 80° E. At the entrance of South bay, near the eastern end of the lake, the strike is N. 20° or 30° E. On the east side of this bay porphyritic granite is exposed, and this rock is also exposed at the extreme eastern end of the main part of the lake. Here at the head of the lake there is a small exposure of crystalline limestone which has a breadth of 10 or 15 yards and a strike of about N. 20° W., which is quite different from the general strike of the rocks of the area in the vicinity. The limestone has a dip of about 60° to the westward and is seen to be cut through by the granite, which thus accounts for the peculiarities in its dip and strike. The limestone band has been arched up by pressure from beneath at the time of

the eruption of the granite. At Hull's landing, near the mouth of Jack's creek, the rock is a gneissoid mica granite.

At Julian's landing, in the fifth concession of Burleigh, the lake is bordered by a band of Laurentian rocks which has a breadth of less than half a mile. To the north of this Silurian limestone comes in. This area of Silurian has a breadth here of about one and one-half miles and extends east and west some distance. Little Cedar lake, which occupies part of lot 8 in the fifth concession and parts of adjoining lots, lies in the contact between the Silurian and the Laurentian hills to the north. These hills are high around Loon and Big Cedar lakes, and in places are cut through by quartziferous pegmatites. Considerable quartz, which runs through the granite in vein-like forms, has segregated out of the rocks. This quartz has a very glassy appearance. Several samples of the mineral from the surrounding district were found to contain no gold. An outcrop of quartz in schistose rock near the boundary of lots 5 and 6 in the first concession of the township of Harvey however showed a value of \$2.25 in gold per ton from samples collected by the writer and examined by the Provincial Assayer. This outcrop of quartz is at the shore of the lake and is situated a short distance from Burleigh Falls.

There is a good water power at Burleigh Falls, and a short distance to the northwest some work has been done in examining the Silurian rocks, to which reference has been made, for lithographic stone. The rock here is similar in character to that which has been worked for lithographic purposes in the township of Marmora to the east.

The road running from Burleigh Falls to Apsley village in the southeast corner of the township of Anstruther is known as the Burleigh road. A branch road runs from Julian's landing northward and joins the Burleigh road at lot 7 in the sixth concession of Burleigh township. From this point northward to Apsley the road keeps pretty close to the valley of Eel's creek, which it crosses at two or three places. Along this road to Apsley, with the exception of syenite, a similar assemblage of crystalline rocks is exposed to that

which has been described as occurring farther to the south and east. After crossing the area of Silurian limestone, which has been described as lying a short distance north of Julian's landing, the road traverses a wide band of crystalline limestone, interspersed with black gneiss. The crystalline limestone is cut by numerous dikes of granite, which carry considerable tourmaline and some magnetite.

From Apsley a trip was made down the Wellington road and a camp was established on lot 21 in the fourth concession of Methuen, at the edge of the stream known as North river. Work was carried on with this point as a centre for a few days, our object being to trace the corundum-bearing syenite belt farther to the northeast than we had succeeded in doing while camped on the Bennett property.

A considerable variety is shown in the rocks going from Apsley down to where the road crosses the North river. Most of these may be referred however to classes already spoken of in connection with other parts of the district. A short distance east of Apsley a quartziferous pegmatite dike was seen cutting through crystalline limestone. The dike attracted attention from the fact that it contained considerable graphite as a secondary constituent. This mineral was found to fill numerous cracks in the dike matter and was present in sufficient quantity to have caused someone to sink a shallow pit on the dike in search of a workable deposit of it. This graphite is evidently a deposit from liquid matter similar to deposits of anthraxolite, in which the mineral is found coating crystals of other substances, as in the deposit a few miles north of Kingston and in other localities in Ontario.

A vein of barite about an inch wide was found projecting above the surface of the dark rusty gneiss alongside of the road in the green bush about a mile and a half down the Oak Lake road from its junction with the Wellington road.

Some pits have been sunk in the rusty gneiss on lot 26 in the fourth concession of Methuen. The rock contains some copper pyrites and pyrite.

The country was examined for some distance on all sides of our camp on the North river. To the east of the camp, and extending down past the eastern end of Koshkabogamog lake, the surface is composed of hillocks and small depressions which are pretty free from soil and timber. The area in fact represents the surface of a large granite mass, and shows little variety in structure. Some of the granite here, like that occurring around Koshkabogamog lake, previously described, possesses a well-marked porphyritic structure. A short distance west of the camp a band of dark gneiss comes in and has a considerable breadth. Over some parts of this gneissic area there is a thick hardwood bush. About a mile to the west of the camp a small band of coarse pyroxenite was observed. This rock is similar to that which has already been referred to as occurring north of the Blue mountains, some distance to the southwest. Associated with the dark gneiss here, in places, were small segregations, syenite-like in appearance and containing octahedrons of magnetite. No undoubted outcrops of syenite however were seen northeast of the end of the Blue mountains. At their northeast end these mountains, which should properly be called hills, show a face running northwest and southeast. The axis of the mountains themselves, as has been stated, runs northeast and southwest. At their northeast end along the face to which reference has just been made they have a breadth of about one mile. To the north of their northeast end the mountains are bounded by a green hardwood bush, which is underlain in its eastern part by dark gneiss and farther west by crystalline limestone. The gneiss lies along the foot of the syenite hill in a manner similar to that which it has been described as doing near the edge of Mountain lake on the Bennett property. The gneiss is here also cut by dikes of coarse syenite. It would seem that the syenite disappears here under the gneiss. There is a small lake on or near lot 19 in the fifth concession. It is known as Burritt's lake, and it lies about one half mile from the end of the ridge.

Township of Chandos.

Having completed the examination of the rocks within easy access of our camp on the

North river, we went across country, following in a general way the strike of the gneiss, to lot 26 in the third concession of the township of Chandos, coming out on the Wellington road. This road runs between the second and third concessions. The branch road which we had taken going down to our camping place on the North river turns off from the Wellington road near lot 21 in the second concession.

There is a deposit of magnetite on lot 27 in the second concession of Chandos on which some work was done some years ago. This deposit lies in a valley a little north of a small lake with swampy shores, known as Devil's lake. The valley appears to owe its origin to the weathering out of a narrow band of crystalline limestone, some of this rock outcropping along the valley. The deposit, judging from a hurried examination of its surroundings, is situated near the contact between granite which lies to the west and schistose rocks to the east. The magnetite is fine grained and the ore body appeared to have a width in places of five or six yards. A pot hole with a diameter of three or four feet has been excavated in the surface of the ore body, probably during the glacial period. There is also a deposit of magnetite on lot 30 in the second concession of Chandos, but we did not visit it.

Along the road a little west of lot 26 in the third concession there is a pink colored rock which has the appearance of syenite and is similar to the material in an outcrop between the station and the iron ore body at Coe Hill, specimens of which were collected by the writer some years ago. The rock at Coe Hill proved on examination to be a mica syenite. The outcrop on the road west of lot 26 in the third concession of Chandos shows at the surface for about one mile past the school house and side line. The mass cuts a crystalline conglomerate-like rock.

The country was examined for some distance around Apsley. Numerous dikes of light colored quartziferous pegmatite were observed. These dikes in many cases carried black tourmaline and they were examined with a view to the discovery of some of the rarer minerals which frequently occur in this association, but with-

Deposit of
Magnetite.

Mica Syenite
at Coe Hill.

Country
around
Apsley
Village.

out success. On lot 27 of the third concession a so-called mica deposit was examined by my assistants, who obtained specimens of rock from it which were composed essentially of white mica and quartz and were similar in appearance to greisen. The rocks also carried some tourmaline and hematite.

On lots 10 and 11 in the tenth concession of Chandos within a short distance of the shore of Loon lake there is an outcrop of rusty gneiss which has attracted some attention from prospectors, as have similar outcrops in which test pits have been sunk in the search for gold in different parts of the district. The rusty appearance is given to the gneiss through the decomposition of iron pyrites, with which mineral the rock is often highly impregnated. The mica schist associated with the gneiss carries garnets. A little zircon was found in some of the crystalline limestone alongside of the road near school-house No. 1. The strike of the rocks east and northeast of Apsley is more nearly north than that of the rocks near Stony lake.

Crab lake, which lies west of Apsley, is surrounded by hills of gneiss whose strike is about east. The gneiss is cut by numerous quartziferous pegmatite dikes.

Township of Cardiff.

My assistant Mr. Hodgson examined the country around Pandash lake. Some gneiss, syenitic in appearance, was found by him near the east end of the lake. Fairly well rounded boulders of nepheline syenite were found near the school-house, lot 30 in the tenth concession of Cardiff. A large angular boulder of nepheline syenite four by five by nine feet in size was found on lot 23 in the seventh concession. Other boulders were found on lots 27 and 29 in the ninth concession. On the latter lot a syenite-like gneiss was observed in place. The boulders were followed north through lot 29 in the eleventh concession, and a ridge of what Mr. Hodgson called syenite running N. 20° E. was found on lot 30 or 31 in the fourteenth concession. A ridge of very fine grained crystalline limestone occurs on lot 29 in the same concession. On the top of the ridge a large boulder of

Traces of
Nepheline
Syenite.

pink syenite carrying magnetite and weighing about two tons, was found. Working west from Cardiff and following the road leading to Gooderham station of the Irondale railroad, boulders of syenite were found at one or two places along the new road north of Cheddar post office.

Monmouth and Glamorgan.

Pink syenite was found in place on lots 16 and 18 in the eighth concession of Monmouth. On lot 15 of the same concession an extensive development of nepheline biotite-syenite was observed. A sample of dark corundum was obtained in the syenite here. The variety of syenite referred to passes into a white variety free from dark mica. Pink syenite occurs bordering the nepheline variety. The syenite is cut in places by granite dikes. At lot 29 in the seventh concession of the township of Glamorgan nepheline syenite outcrops alongside of the railroad track. Syenite containing nepheline outcrops near the road on lot 32 of the same concession.

An outcrop of nepheline syenite was mentioned in my last year's report as occurring on lot 30 in the third concession of Glamorgan. Some blasting has been done in the rock here, it being thought by those who did the work that the blue color of the sodalite which accompanies the syenite indicated copper. This year other outcrops of coarse nepheline syenite were found about a mile east of this one, on either side of the concession line.

There is a very good waterpower at the High falls near the line between lots 5 and 6 in the sixth concession of Monmouth.

Along the road at lot 9 on the seventh concession of Monmouth there is an exposure of crystalline limestone which is cut by light colored dikes of pegmatite. Just east of this nepheline syenite appears. The rock here contains hornblende, and is coarse and gabbro-like in appearance. There is a rather narrow strip of the rock here and then comes in a band of somewhat similar rock, and then going eastward there is an exposure of crystalline limestone carrying apatite and graphite. A little west of Hotspur P. O.

where the road branches off towards Wilberforce, there is a prominent exposure of nepheline syenite alongside of the road. The dark mineral in the rock is here chiefly black mica. The rock also contains a little corundum. On the road going towards Wilberforce, about one-half mile from the turn just referred to, there is a hill to the right of the

road and a valley to the left. This hill is composed of syenite. Much of the syenite contains considerable magnetite. A belt of syenite lying about parallel with the railroad track and to the southwest of it was traced from this point to the vicinity of Wilberforce station and has a length of eight or ten miles. Going east from Tory Hill station by the wagon road, the rock outcrops along the road at a number of points after passing the summit of the hill. Just beyond Alfred Reid's farm buildings the road runs through a rather striking pass in the syenite ridge. Nepheline syenite containing a little corundum was found near where the ridge approaches the railroad track on Mr. Graham's farm, lot 28 in the thirteenth concession, a little south of Wilberforce station. Outcrops of the rock were also examined on lots 21 and 23 in the eleventh concession, and lots 27 in the twelfth and thirteenth concessions. In working eastward from Wilberforce a ridge of nepheline syenite was observed near the point where the wagon road first crosses the railroad, lot 7 in the twenty-second concession of Cardiff.

Proceeding along the wagon road towards Deer lake station, boulders of white syenite carrying brown corundum were found a short distance to the northwest of Leafield post office, lot 24 in the twenty-second concession. The boulders were quite large and angular. One of these lay at the roadside just over the brow of the hill before coming to the post office, and several others were noticed in the field to the right. From the post office a prominent hill of white rock can be seen lying across a ravine about half a mile to the eastward. It was thought that these boulders had likely come from this hill, and on making an examination of it corundum was found in place. Some of the syenite in the hill has a

quite strongly marked porphyritic structure. Syenite shows at the road-side about half a mile to the southeast of the post-office.

Herschel and Faraday.

There is an extensive development of syenite with, in places, coarse nepheline in stringers around the northeast end of a small lake and along the wagon road for half a mile just after passing the summit of a high hill which lies near the point where the townships of Cardiff, Herschel and Faraday come together. The syenite has a strike of about N. 30° W., and can be traced in that direction for a considerable distance from the road. This brings this area into the same belt of rocks as the areas to which reference has just been made, and which may be said to follow in a general way the line of the Iron-dale Railway from a little to the south of Gooderham station to the vicinity of Deer Lake station. The area lying near the junction of the three townships referred to will be shown later to be connected with the outcrops of syenite lying farther to the southeast in Faraday, and also with those of Dungan-
gannon.

The outcrop occurring near the junction of the three townships is bordered on the northeast by crystalline limestone and on the southwest by gneiss. Many of the outcrops of this rock in the district are associated with crystalline limestone. In fact the two rocks are so commonly found together that some explanation seems to be required for their frequent association. This point will be referred to again.

The village of Bancroft, the location of which is wrongly marked on some maps, is situated on lots 60 and 61, Hastings road, which runs along the eastern boundary of Faraday. The village is underlain by syenite, and outcrops of the rock occur along the York Branch river which runs through the village, and at other places in the vicinity. The southern edge of the syenite, where it comes in contact with crystalline limestone, is at the rapids alongside the mill at the edge of the village. The strike of the rock here is about N. 80° W. and the angle of dip of the limestone is about 60° to the

Corundum
near Lea-
field P.O.

Connecting
Corundum
Areas in
Cardiff,
Herschel
and
Faraday.

In the East-
ern part of
Faraday.



Fig. 1. Corundum, c, forming core of mass of Mica, m (p. 210). The figure shows the parts produced by breaking the mass in two. The Mica is evidently an alteration product of the Corundum. Bennett Mine, Blue Mountains, Township of Meduen. Natural size. From a drawing by William Revell.



Fig. 2. Corundum in centre of nodular mass of differentiated Syenite, (p. 210). Lot 15, tenth con. Methuen. $\frac{3}{8}$ natural size. —Müller.

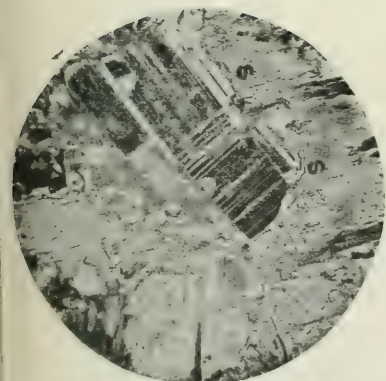


Fig. 3.—Photomicrograph of thin section of Norite, Farham (p. 228). The Plagioclase shows twinning according to the Albite and Pericline laws, and is partly surrounded by its alteration product, Scapolite (s). —Müller.

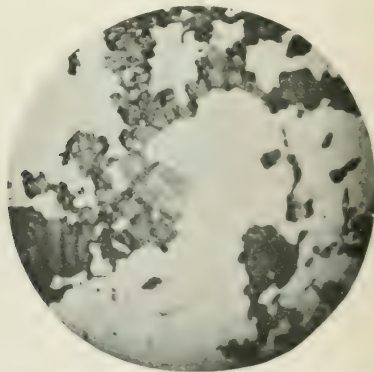


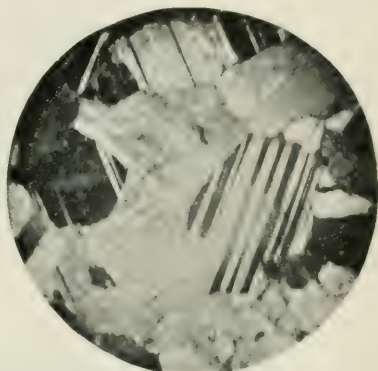
Fig. 4. Photomicrograph of thin section of Scapolite-hornblende rock (p. 229). Glendower iron mine. —Müller.



Crystal of Corundum, Raglan Township. Size 4 by 1½ inches.
—Miller.



Photomicrograph of thin section showing Corundum in Nepheline syenite. The figure brings out the parting planes in the Corundum.
—Miller.

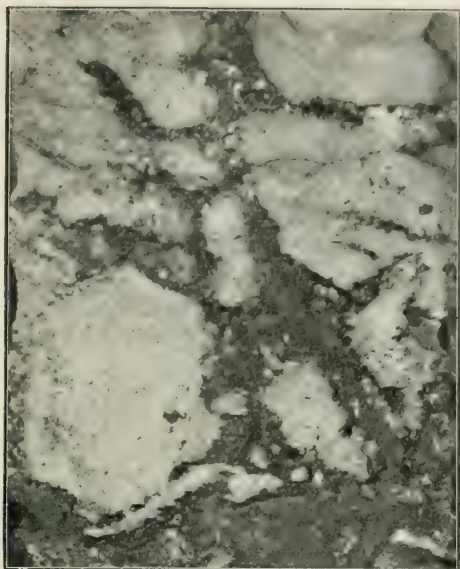


Photomicrograph of thin section of Anorthosite from South Sherbrooke (polarized light).
—Miller.

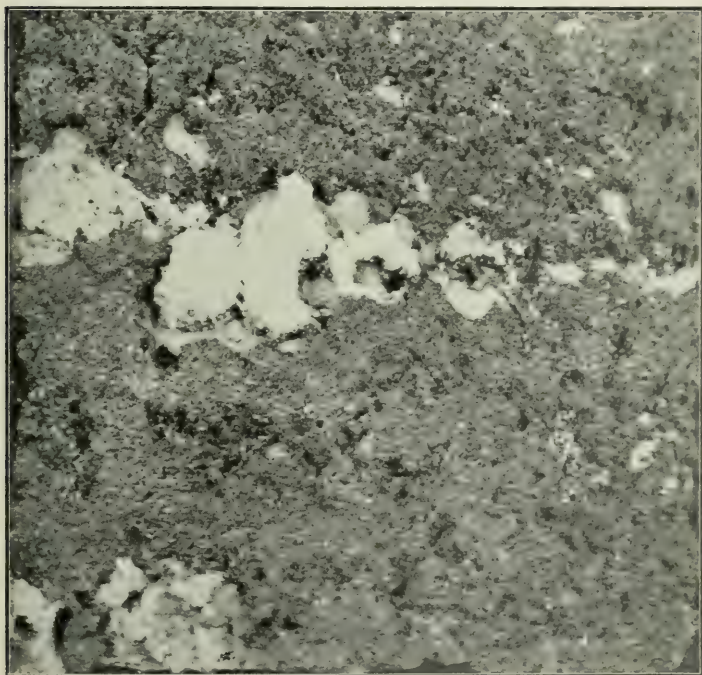


Corundum in Anorthosite, in sixth concession of South Sherbrooke.

—Miller.



Weathered surface of rock composed of Nepheline and Felspar, the latter mineral being discolored by Oxide of Iron. Natural size. —Miller.

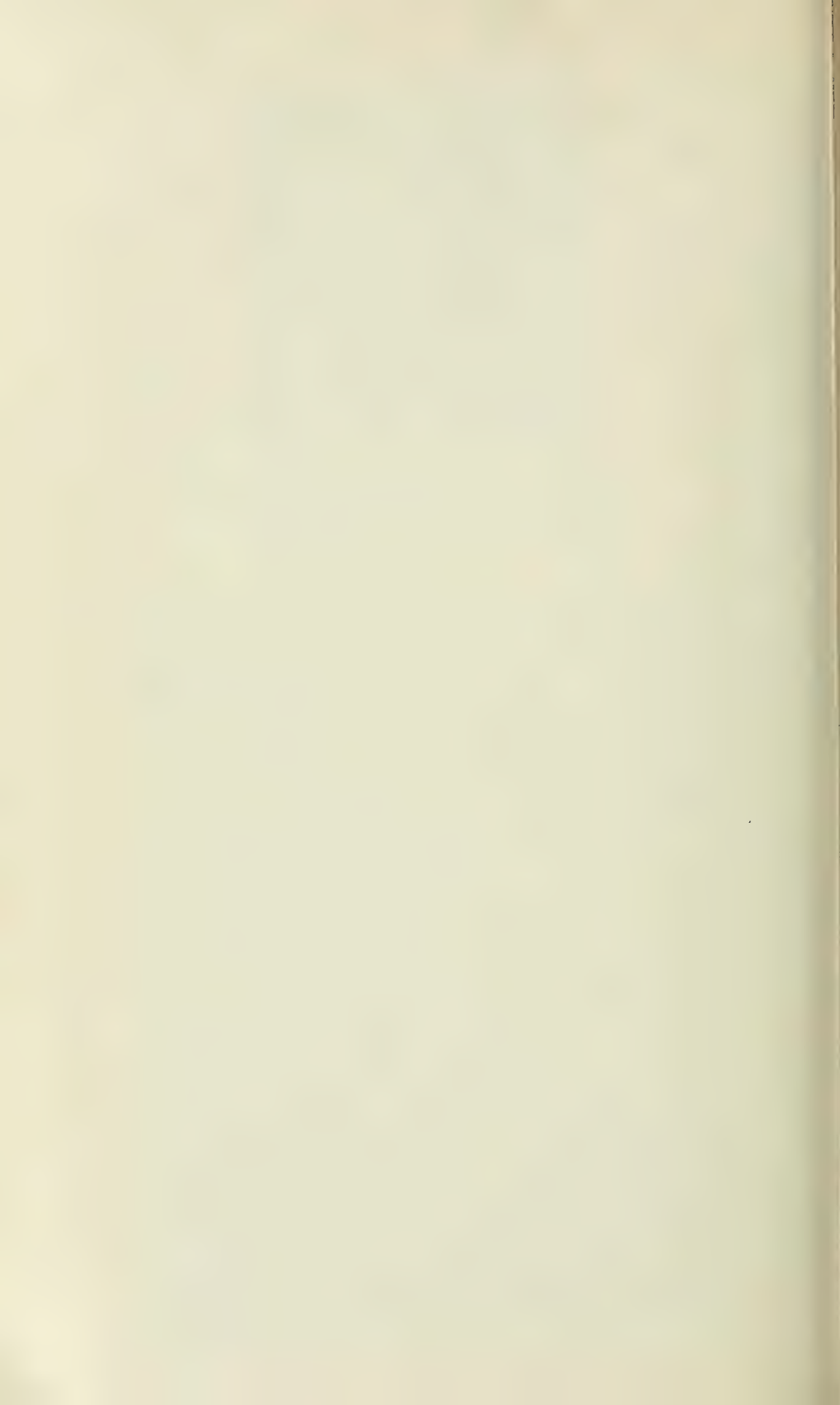


31 Weathered surface of rock showing Nepheline associated with Hornblende, Garnets, and Felspar. Township of Lyndoch. —Miller



X-ray Photograph of corundum grains. No. 16, 24 and 100 represent grains of Ontario corundum of the numbers indicated by these figures. No. 20 represents grains of so called ruby corundum from the southern U. S. The photograph shows that these grains are not corundum, as they are scarcely permeable to the X-rays. X-ray photographs offer a means of determining the purity of commercial samples of grain corundum. —Miller.





southward. The syenite shows in places for about half a mile along the Hastings road north of the village, and is associated with a little crystalline limestone. The rock bordering the syenite belt to the northward is a gneissoid granite, which rises into quite prominent hills.

Along the western edge of the river, at the rapids in the village, the syenite was found to contain nepheline, and on tracing the syenite band to a point about half a mile west of the village a little corundum was found in place. The mineral appears to occur very sparingly in the syenite in this vicinity.

Going west from Bancroft the band of syenite can be traced practically continuously for some distance. Drift deposits however interfere to some extent. The belt was followed to lots 10 and 11 in A concession of Faraday, and westward in the general direction followed by the Monk road. The syenite band appears to cross the road near a little lake on 16 A. A prominent exposure of syenite shows on lot 19 A. About lot 23 A., just before coming to a bend in the road to the west, nepheline syenite is exposed on the north of the road. Syenite carrying nepheline crosses the road at 26 A and B. The strike here is N. 70° W. Crystalline limestone comes in along the border of the white variety of the syenite. The whole band of syenite here has a breadth of only 8 or 10 yards. The band of crystalline limestone which flanks it on the west has a breadth of two or three miles. Pink syenite was found on or near lot 32 in the fourteenth concession. This outcrop carries a quantity of magnetite in places and has a considerable breadth. About lot 29 in the same concession there is a well developed band of nepheline syenite which is about 200 yards wide. It carries magnetite and coarse nepheline, and has a strike of N. 30° W. It runs up into a high hill and is well exposed. Following along the strike S. 30° E. from here for about one mile outcrops of nepheline syenite were seen in three or four places in a hardwood bush.

From a hill on part of the belt of nepheline syenite on lot 30 or 31 of the fourteenth concession a clearing can be seen on the Deer Lake road to the northwest. The belt of white syenite could be seen in the distance keeping

a direction of about N. 30° W. to within a very short distance of Deer Lake road, near the point where the outcrop which has already been referred to was observed in the vicinity of the junction of the three townships of Faraday, Cardiff and Herschel. This shows that the belt of syenite traced west from Bancroft through Faraday is continued, as has been stated by the writer, through the southwestern corner of Herschel, thence through Cardiff and around through Monmouth, keeping here pretty well the direction followed by the Iron-dale railroad, and into Glamorgan.

In the part of the band last referred to in Faraday the nepheline syenite is bordered by a band of pink syenite which carries magnetite, and is about one-quarter of a mile wide. The white syenite on lot 29, concession fourteen, carries considerable magnetite with a little pyrite, but nepheline is not strongly developed in it. It also contains some dark colored mica. The hills of syenite here are fully as high as the hills of other rock surrounding them. West of the syenite is a broad band of crystalline limestone.

County of Hastings.

Having now traced the belt of syenite rocks from the township of Glamorgan in a general eastward direction through Monmouth, Cardiff, Herschel, and Faraday to the village of Bancroft on the Hastings road, which runs along the eastern side of Faraday and forms the boundary between this township and the township of Dungannon to the east, it is proposed to trace the belt eastward through this township and into adjoining townships, and to show the connection of this part of the belt with the belt of corundum bearing rocks which lies some distance to the northeast. This latter belt has a length of over 30 miles. A description of it was given in my report for 1897, and the map which accompanied the report showed the location of the belt.

Township of Dungannon.

It will be seen that corundum occurs much more frequently in the part of the belt which lies to the east and northeast of Bancroft than it does in the part lying to the west of this village. Moreover deposits of corundum will be de

Tracing the belt of Syenite Rocks eastward.

Explorations along the York Branch.

scribed in the part of the belt now to be considered which are much richer in the mineral than are any of those lying to the west of the village. It may be stated that the whole belt of syenite and corundum-bearing rocks has a length of approximately 75 or 80 miles. About one-third of the belt lies to the west of Bancroft and the remaining two-thirds to the east and northeast of this village.

From Bancroft the syenite belt can be traced practically continuously through the township of Dungannon to the bridge across the York Branch river in the eleventh concession of the township. Some of the outcrops consist of very coarse grained rocks which contain a high percentage of nepheline. The syenite runs across the river above the bridge near the mouth of Egan's creek. On the east side of the river, near the bridge, the strike of the syenite is about north. Just north of the road, to the west of the bridge, there is an outcrop of coarse syenite carrying much nepheline and some sodalite. This outcrop was among the first of those discovered in the district by Dr. F. D. Adams, who collected specimens from the vicinity, and some of the material was subjected to examination by himself and Dr. B. J. Harrington.³ No corundum was found in the vicinity however till 1898, when we found the mineral in syenite at points along the river's bank on both sides of this outcrop.

The part of the belt on the west side of the river crosses to the east at Egan's chute, which lies a short distance below the bridge to which reference has been made. Near the chute the belt, which is quite narrow here, is broken through by a hill composed of a rather dark igneous rock. On the other side of this hill nepheline syenite of similar character was again found in places and the belt was traced with various slight breaks up the eastern side of the York Branch river to a short distance below where Papineau creek enters this river in the tenth concession of the township of Carlow. Much of the syenite exposed along this part of the belt is rich in nepheline, and corundum was found in the rock at numerous places.

Syenite also runs up the west side of the York river and outcrops show at intervals between the eleventh concession of Dungannon and the mouth of Papineau creek.

In Dungannon corundum was found near the centre of lot 18, in the eleventh concession. Some of the mineral is here light bluish gray, almost white, and it occurs in large sized pieces.

The percentage of the mineral over the small surface examined here compares favourably with that seen in deposits in other parts of the district. Time did not permit of a careful examination of the lots immediately to the west, but from this lot to lot 13 in the same concession the rocks are covered to a considerable extent by drift and alluvial deposits and it is difficult to get exposures. On the north part of lot 13 there is a high hill composed essentially of granite which runs down into lower ground about half way across the lot towards the south.

On examining a map of the township of Dungannon it will be seen from the outcrops of syenite which have been referred to that the belt of this rock follows pretty closely the general direction in which the York Branch river runs.⁴ Near Bancroft the strike of the rock in the belt is pretty well east and west. From this point the direction of strike swings around gradually conforming to the general direction of the course of the river, although not swerving at the smaller bends, till near the mouth of Egan's creek, and at the bridge on the eleventh concession the strike of the syenite belt and the direction of the course of the river are approximately north. The general course of the river from this point on for 12 or 15 miles to the mouth of Papineau creek is north, and the strike of the syenite band conforms to it. Near the mouth of Papineau creek the river

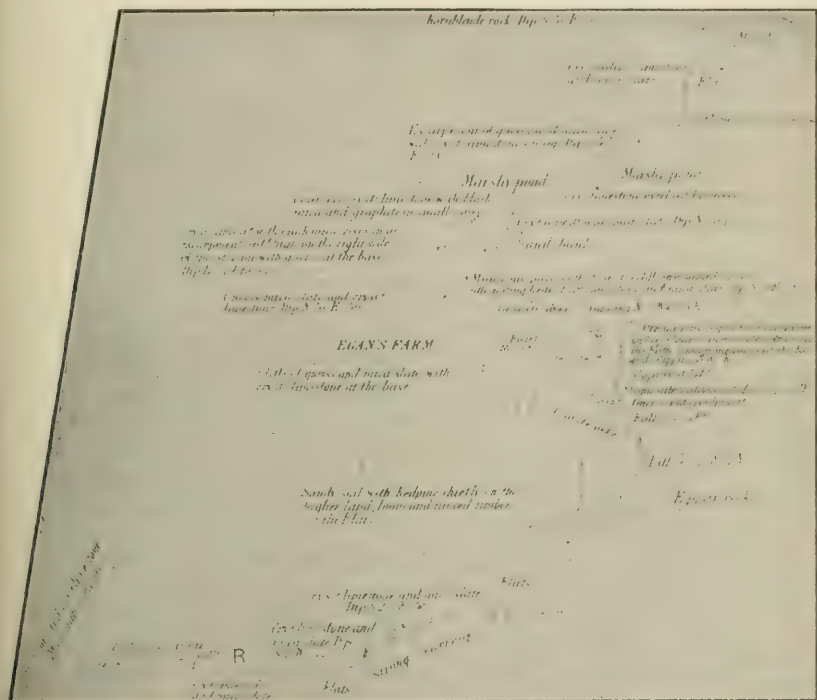
⁴ The late Alexander Murray of the Canadian Geological Survey mapped the York river in 1853. A photographic reproduction of a part of his map with accompanying notes on the rocks along its banks accompanies this report (p. 211). The rock he calls mica slate is nepheline syenite, which in some cases possesses a well defined laminated structure and frequently carries corundum. What he calls hornblende rock is nepheline syenite with hornblende, and in some cases corundum and garnet. His quartzite is granite. Egan's farm is now known as Bronson's or Lancaster's.

³ Am. Journal of Science, July, 1894.

makes its first great bend after leaving the bridge on the eleventh concession of Dunggarron 12 or 15 miles below. This bend of the river is to the eastward, and the strike of the syenite changes again and conforms, as will be later described, to the course followed by the river.

As has been stated, the part of the syenite band on the west side of the river crosses to the east side at the first of the chutes which lies a short distance north or down the river from the bridge. Here on the east side of the chute the syenite is associated with some

ence has just been made, and below the sharp turn which the river makes after leaving the latter, syenite and crystalline limestone are seen at the edge of the rapids on the east side of the river. The limestone underlies the syenite and occurs at the water's edge. It has a strike somewhat east of north and dips eastward at an angle of about 40°. The channel of the river follows pretty well the direction of the limestone, apparently having been formed through this rock wearing away more readily than the other rocks with which it is associated. The limestone at the chute



Part of York Branch (Shawashkong) River, after Murray, 1853.

crystalline limestone, and a little north of the chute the narrow syenite belt is broken through by a hill of igneous rock which in the field was taken to be a diorite or gabbro. The syenite here is much more schistose in structure than the rock in the hill, and from this it was inferred to be the older of the two rocks. A little north of the hill considerable porphyry was found in the rock. At the second chute, which lies a half mile or so down the river from the one to which refer-

ence is graphite-holding. The bends in the river appear to be due to the fact that the limestone band has been disturbed or broken across by igneous masses. The river has not been able to cut its way through these so readily as through the limestone, and has hence been caused to swerve out of its course in places.

Following down the east bank of the river, we found the syenite belt to be practically continuous. The rock is frequently very

coarse in grain and contains a high percentage of nepheline. The belt keeps a pretty direct course and is thus at some points some distance from the river, as the latter has numerous bends. Towards the northeast corner of Dunganon we came to a large beaver meadow which breaks through the syenite belt and has its outlet in low land towards the river. The syenite runs up to the south edge of the meadow and outcrops again directly opposite, on the north edge. The syenite occurs in distinct ridges, which are frequently broken through by small ravines.

South of the beaver meadow referred to we found corundum of different colors. Some of this was of a deep blue and had a rather striking effect, some of the crystals standing well above the general surface of the rock, on account of the different rates of weathering of the two, and presenting a great contrast in color to the white of the rock.

Crystals
of Blue
Corundum.

Monteagle and Carlow.

At the river bank and near the point where the corners of the three townships of Dunganon, Monteagle and Carlow come together we found an outcrop of nepheline syenite which showed on its weathered surface a high percentage of light colored corundum⁵. An old timber road comes down to the river just above the end of the ridge which rises into the hill on which the best outcrop occurs. The syenite, which, as stated, contains considerable corundum, was traced north here for about half a mile and was broken across at one point by a swampy wooded ravine. In addition to corundum the rock carries in places sodalite and white mica in flakes of considerable size. The rock here possesses a well defined schistose character, as does the syenite in many parts of the district. The corundum is light in color and the individuals of the mineral are of comparatively small size. Over a distance of some yards across the strike corundum is thickly scattered through the rock. Considering the situation of this deposit, its nearness to the water power at the Egan chutes, and the percentage of

A promising
Deposit in
Monteagle.

mineral carried by the rock, it appears to be one of the most promising in the district from the economic point of view.

The occurrence in this deposit of high percentages of both corundum and nepheline is somewhat exceptional, as usually where the percentage of one of these minerals is above the normal the other is either absent or only sparingly present.

Near the boundary between the townships of Monteagle and Carlow, and on the east side of the river to the northeast of Norway bay, there is an outcrop of pink syenite at the river's edge. Farther down the river and a little above the mouth of Papineau creek, rock of similar character outcrops again at the river's edge.

Just below the mouth of Papineau creek syenite is found on both banks of the York Branch river. The river near the mouth of Papineau creek, as has

been previously stated, changes its course from northward to eastward. At the mouth of Papineau creek and for some distance to the east and north there is a tract of low, level, somewhat swampy ground, which is partly flooded at some seasons of the year. The outcrop of syenite at the edge of the York river just east of the mouth of Papineau creek comes up in this low land and is of small size. It can however be traced back from the edge of the river for some distance along a low, rocky ridge which rises through the alluvial deposits. On the south side of the York, opposite this outcrop, a more extensive development of the syenite is exposed, the belt here forming higher ground. It has a breadth of about 400 yards and is bounded on the west by crystalline limestone and on the east by crystalline limestone and gneiss. On both sides of the York here the rock has in places a high percentage of nepheline.

From the higher parts of the hills a tract of country of considerable size can be seen which is composed of the low land which has been referred to as lying north and east of the mouth of Papineau creek. This tract has the appearance of being surrounded by a range of high hills which seem to be arranged in a somewhat circular form. Some of these hills lie immediately to the west of Papineau

⁵This outcrop is on lot 2 in the second concession of Monteagle.

creek. Others lie to the south and north-east of the York Branch, and one of the highest ranges of hills is that which runs from the northeast to lot 14 in the fourteenth concession of Carlow. It was on this lot that corundum was first found in the district. An account of the outcrop of rock which carries the mineral on this lot was given in my last year's report.

From the mouth of Papineau creek eastward, along the north parts of the lots in the tenth concession of Carlow, outcrops of syenite were found at a number of points. Foster's rapids on the York Branch are situated on the southern half of lot 19 in the tenth concession. On the northern half of this lot and the adjoining lot 18 there is a hill which stands at a considerable height above the surrounding area. The southern face of part of this hill comes down to the edge of Foster's clearing, and in the clearing near the foot of the hill several fairly large angular boulders of nepheline syenite were found. These boulders lie near the west side of the road which runs from the main road into Foster's buildings. Corundum was found in place on the north face of the hill. This part of the hill lies about one-half mile to the southeast of the east end of Foster's lake, and near the boundary between the tenth and eleventh concessions. The rock here is basic in character, some of it having the appearance of pyroxenite. Nepheline occurs through some of the darkest of it.

From the hill referred to a ridge more or less continuous can be traced eastward along the northern part of the tenth concession to the point where the York Branch crosses the line between the tenth and eleventh concessions at lot 28. The road which crosses the river west of the rapid at Campbell's farm, lot 26, near the line between the ninth and tenth concessions, and runs northwestward towards New Carlow, follows the low land to the north of this ridge for some distance. On the north face of the ridge and near its foot, south of a point on the road which is distant about one-half mile from Campbell's bridge, nepheline syenite was found in place. It

here dips under crystalline limestone, which lies farther up the face of the ridge. The limestone is itself overlain by gneiss. Other outcrops of syenite would no doubt be exposed between this point and the outcrop on the hill north of Foster's, were it not for the covering of soil which overlies a great part of the surface. On part of the ridge a coarse gabbro-like rock is exposed. This may, as in other cases examined, be only a facies of the syenite rock.

Eastward across the road the ridge runs out into a point which lies between two somewhat marshy bays of the York Branch. The bay on the north is known as Robinson lake. Syenite was found in place on this point on the northern face of the ridge.

The ridge is continued on the east side of the York Branch and was followed through marshy ground to near the edge of the Mississippi river. In this part of the ridge no syenite was found in place, but crystalline limestone was observed under conditions somewhat similar to those under which it is associated with syenite farther west on the ridge. The syenite occurs here in all probability in the low ground to the north of the foot of the ridge. Time did not permit us to attempt to follow the ridge east of the Mississippi in the tract of country lying between this river and the Madawaska, but it seems likely that outcrops of syenite do occur here and that this part of the belt runs eastward till it joins the main part of the belt of the corundum-bearing rocks in the northern part of the township of Lyndoch to the east. An examination of the map of the corundum belt which accompanied my report for 1897 will show that the part of the belt which runs down into Lyndoch is much wider and extends farther south than does that part of the belt which lies farther west in Raglan and Carlow. The narrow belt of syenite rocks which we traced in 1898 from near the mouth of Papineau creek, if continued eastward of the Mississippi and across the Madawaska, will strike the southern edge of the belt mapped in 1897 in Lyndoch.

The association of crystalline limestone with the nepheline syenite at points in the

tenth concession of Carlow has been referred to, as well as the frequent association of these rocks at various points along the York Branch between the mouth of Papineau creek and the bridge on the eleventh concession of Dungannon. Crystalline limestone also occurs at the eastern end of Foster's lake, lot 19 in the eleventh concession of Carlow, and at other places in the twelfth and thirteenth concessions of this township, as at Armstrong's mill site on Papineau creek, lot 6 in the thirteenth concession. This rock lies in a trough-like depression between the band of syenite in the tenth concession with the hills immediately south of the York Branch and the hills in the thirteenth, fourteenth and fifteenth concessions of the township. These last three concessions form part of the belt of corundum-bearing rocks which was mapped in the report of 1897. A great part of this trough has a covering of sand, and in addition to the crystalline limestone there are outcrops of granite, much of which is pegmatitic in character and which gradually rises into the hills in the thirteenth and fourteenth concessions. The outcrops of corundum-bearing syenite in the northern concessions of Carlow, as stated in last season's report, occur isolated. They cut through a dark gneiss and both the gneiss and the syenite are cut through by quartziferous pegmatites. Along the York Branch, as has been stated, the outcrops of syenite form a band which is practically continuous. It would thus seem that the outcrops of corundum-bearing syenite in the northern concessions of Carlow occur isolated owing to the fact that the gneiss through which they cut has not been worn down sufficiently to allow the band of syenite to be exposed continuously. That the isolated outcrops are parts of one continuous band is evident from the fact that they occur in line over so many miles, and from the fact that the outcrops of these rocks in Dungannon and some other townships do form one continuous though often narrow band over considerable distances. The lack of continuity of the syenite in some parts of the belt is also due to eruptions of coarse granite through it, as well as to difference in

degree of denudation of the overlying dark gneiss and crystalline limestone. That some of the syenite has been subjected to strong metamorphic action is evident from the well developed schistose structure which it presents. The occurrence of two belts of syenite, one of which runs parallel with the tenth concession of Carlow and the other to the more northern concession of this township, is due to two causes, viz.: the overlying gneiss and limestone and the intrusion of granite of later age than the syenite. A structure of a similar kind was referred to on a preceding page in the description of the syenite rocks in the township of Methuen. In Methuen the syenite belt of the Blue mountains is separated from and runs parallel to a narrower belt which lies to the south of a trough which is filled with dark gneiss, together with some crystalline limestone and a little granite.

County of Renfrew.

Leaving Carlow behind, we enter the county of Renfrew. With the exception of revisiting lots 1 to 4 in the eighteenth and nineteenth concessions of Raglan and examining the lots in the vicinity of Palmer's rapids we did not in 1898 re-examine other parts of the belt of corundum-bearing rocks which were traced through this township in 1897.

Township of Raglan.

In the report for 1897 reference was made to the occurrence of corundum on lot 19 in the eighteenth concession, and on two or three lots immediately northeast of the Madawaska along the line between the eighteenth and nineteenth concessions of Raglan. The high hill, known as Indian Hill, on lot 19 was re-examined last season, and in addition to the outcrops of corundum-bearing rocks which occur near the summit of the hill and towards its west face other outcrops of the rocks were found near the base of the hill on the opposite face. The outcrops near the summit of the hill contain garnet in places in association with the corundum, which is a somewhat rare association, having been found

Tracing the
Corundum
belt to
Madawaska
River.

in but few of the numerous outcrops examined in the district.

From the Indian hill on lot 19 the rock can be traced through lot 20, there being an outcrop of rock on this lot similar to some of that which usually carries corundum. This rock is a light colored syenite and contains considerable white mica. The side hill on which the outcrop occurs (in which it may be said no corundum was found) is pretty well covered by soil and trees. The outcrop of syenite being exposed by a recent fire which has destroyed the surrounding bushes can be seen for a considerable distance to the northeast. From the foot of the hill on which this outcrop occurs a sand plain stretches out to the Madawaska, at the edge of which, and in a line which runs in the direction of the concessions from the last mentioned outcrop, there is another small exposure of syenite. This exposure is situated on the south side of the river, at the head of the little rapid known as the Horserace. This outcrop carries corundum and is situated on the west side of lot 24 in the eighteenth concession, very close to the line between lots 23 and 24.

Across the river from this outcrop and a short distance from the bank corundum again shows in the rock on lot 24 of the eighteenth concession. From this lot on to and including lot 28 corundum was found in a number of outcrops. These outcrops are situated on the north end of the lots in the eighteenth concession and on the south end of the lots in the nineteenth. An outcrop occurs at the edge of a small swamp at the post where the corners of the four lots 24 and 25 in the eighteenth concession and 24 and 25 in the nineteenth come together. The posts in the centre and on the edges of the concession were here found in place. Being situated in low ground they had escaped destruction by the fires which have burned over the district during the years which have elapsed since the surveys were made. Very few of the original posts have escaped these fires.

To the east of lot 25 the chief outcrops of corundum are on the south parts of lots 26, 27 and 28 in the nineteenth concession. The rock in which the mineral occurs is for the most part pink in color and coarse grained.

Much of the corundum is coarse grained, agreeing in this with the rock in which it occurs.

A little east of the post which has been referred to as being situated at the point of contact of the four lots, and north of the concession line, there is an outcrop of nepheline syenite. This outcrop is at the edge of the small swamp mentioned. These occurrences of this variety of syenite are met with at intervals, as stated in last year's report, throughout the whole length of the belt running from Carlow on the west to Sebastopol on the east. The outcrop just referred to was not observed till last season. The nearest outcrop of similar character observed to the west is on lot 1 in the nineteenth concession of Raglan, and the nearest to the eastward is in the western part of Brudenell.

It will be noticed from the description given that the outcrops of corundum-bearing rocks across Raglan follow very closely the direction of the line between the eighteenth and nineteenth concessions, being sometimes just over the line on one side and sometimes on the other. Thus corundum occurs on the concession itself in the most western part of the township, as well as on the south parts of lots 1 to 4 in the nineteenth and on the north parts of 3 and 4 in the eighteenth. Then near where the concession line crosses the Madawaska the outcrops occur in the same relation to it, and others occur in the same situation as regards the line between these lots and the lots along the extreme western end of the line. Moreover, it was stated in last year's report that corundum-bearing rocks occurred sparingly on the north part of lot 35 in the eighteenth concession, this lot being the one the farthest east. The outcrops thus, from one side of the township to the other, have a rather remarkable arrangement in that they all follow so closely the direction of the concession line.

Radcliffe and Brudenell.

A small outcrop of corundum-bearing rock was also found near the edge of an old lumber road on lot 21 in the first concession of the township of Radcliffe. Other small outcrops also occur on one or two other lots immediately to the

A small
Area
parallel to
the Main
Belt.

northeast of this one. These may be said to form a small belt which has a direction roughly parallel to that of the main belt. It was stated in last year's report that the strike of the rocks changes near the western edge of the township of Brudenell and runs towards the northwest. This small isolated belt in Radcliffe serves to connect the outcrops near Palmer's rapids with those in the fifth, sixth and seventh concessions of Brudenell. These latter outcrops as shown on last year's map appeared to be somewhat disconnected from the part of the belt lying to the southwest. It may be stated that the corundum on lot 21 in the first concession of Radcliffe is associated with garnet similar to the outcrop referred to on lot 19 in the eighteenth concession of Raglan.

A number of large boulders rich in corundum were found on lot 19 in the sixteenth concession and on lots 18 and 19 of the fourteenth concession in Raglan. These boulders were no doubt carried southward by ice during the glacial period.

Sebastopol and South Algona.

In last year's report it was stated that nepheline syenite boulders had been found in places thickly strewn along a line running east of north from the northeast corner of Lyndoch into the adjoining township of Sebastopol and across that part of the Opeongo road which lies to the west of lake Clear. A few were also found to the north of the lake. The position of these boulders was shown on the map, and it was stated that the outcrop from which they had been transported lay to the north. During last summer the outcrop was found in the first concession of the township of South Algona, which bounds Sebastopol on the north.

On lot 14 in the first concession of South Algona a number of nepheline syenite boulders were found and the rock was found in place on lot 11 of this concession. The syenite is here very coarse in grain, and the nepheline occurs in it in large sized pieces. The rock was also found in place across lots 8, 9 and 10 to the eastward and across 14, 15, 16 and 17 to the westward. The strike of

the syenite here is about N. 75° E., magnetic. The band assumes the character of a series of dikes which cut a pinkish colored rock. They vary from one or two feet to 30 or 40 yards in width. The rock carries magnetite, some pieces of this mineral being a foot in diameter. The syenite is for the most part coarse in grain and somewhat porous. No corundum was found in place here, but some boulders carrying the mineral were found a short distance south of the outcrop.

The direction followed by the glacial striæ in this part of the field is N. 15 E. magnetic. Had time permitted no doubt other outcrops of syenite could have been found farther eastward.

In the southernmost part of Sebastopol a number of outcrops of nepheline syenite were found. In the first concession a band of this rock was traced through lots 13 to 5 inclusive. On lot 6 the band is at least 300 yards wide, but tapers towards the east and west. Closely associated with the syenite are more basic rocks. The band is flanked on both sides by crystalline limestone. The band was traced from the west end of Highland lake, lot 12 in the first concession, to the south end of lot 5 and appears to run into Griffith on the south. It crosses Highland creek at Lambert's mill. The strike of the rock is north-east.

Nepheline syenite boulders were found alongside of the road on lot 4 in the fifteenth concession of Denbigh.

Along the Snow Road.

The road from lot 3 in the thirteenth concession of Denbigh follows Hyde's creek to the vicinity of Denbigh village. The creek is quite rapid in places. From the Westward on the Snow Road village to the Snow road crossing is a distance of about three miles. The rock here exposed is gneiss, associated with which there is a narrow band of crystalline limestone which outcrops about one-quarter of a mile from the crossing.

Following the Snow road westward from the crossing an area of gray or white granite with a width along the road of 12 or 15 miles comes in. The eastern boundary of this area is near the line between Denbigh and Ashby,

and the western boundary in the latter township is not far from the edge of Mayo. The rock is very uniform in character. That the area occupied by it is unsuited for cultivation is evident from the fact that for about 12 miles along the road, through what is known as the "long bush," there are no settlers. Rock of similar character is exposed some miles to the northeast of Griffith's, north of the Madawaska river.

The road in Ashby runs between Otter and Weslemkoon lakes, where the granite is well exposed.

Proceeding westward through Mayo, from the edge of the granite area, the rocks exposed are gneiss and crystalline limestone.

From Mayo the road proceeds westward through Dungannon, and crosses the York river at the bridge in the eleventh concession to which reference has been made.

Lanark and Frontenac.

Corundum was found in place in the township of South Sherbrooke, Lanark county, by

Mr. L. J. Gemmell of Perth, in September, 1898. Mr. Gemmell had been in attendance on the prospectors' course at the Kingston School of Mining during January and February, 1898, and while there had had his attention directed to corundum, which was being experimented on at the time at the School. He had learned something of the character of the mineral and of its mode of occurrence, and on going into the field in the following season had decided to look for it. On meeting Mr. Morrow, a resident of the township referred to, a gentleman who has paid considerable attention to the minerals of his district, Mr. Gemmell described to him how corundum occurs in the rocks, laying special stress on the fact that the mineral usually stands well above the weathered surface of the mass in which it is found. Mr. Morrow at once stated that some years before he had observed crystals of mineral attached to the surface of a rock in the sixth concession of South Sherbrooke. The two gentlemen visited the locality together and found a mineral occurring as Mr. Morrow had described it. They

were in doubt however as to whether it was corundum, on account of its being almost white in color and thus differing from the specimens Mr. Gemmell had seen in Kingston. However, to make sure of the point, they sent specimens to Prof. Nicol of the School of Mining, who assured them that it was corundum without a doubt.

Immediately after the "find" had been verified Mr. Gemmell invited the writer to visit the locality, in order that a comparison might be drawn as regards the richness of these deposits in Lanark with those situated in North Hastings and adjoining areas fifty miles or so to the northwest. A visit was accordingly made to South Sherbrooke in October, after the completion of the field work which has been described in preceding pages. It was found that the corundum occurs in a belt of igneous rocks which has a strike about parallel to that of the concession lines of the township. This is N. 45° E., astronomical. This belt, so far as examined in the township, lies wholly in the sixth concession and has been traced from lot 12 to lot 1, the latter lot lying at the boundary between this township and Oso to the west. The breadth of the belt is about three-quarters of a mile. The belt also extends into Oso, keeping the same direction.

The largest crystals of corundum observed in the rock had a length of about 1½ inches,

but are thick and more tabular in form than most of those found in

North Hastings and adjacent country. The majority of the crystals have a diameter of about half an inch and show a rather striking uniformity in size, there being scarcely any of the mineral in small grains. The color of the mineral is also pretty uniform, being light gray or almost white, and sometimes light pink or flesh colored. It may also be stated that the corundum is distributed across the whole breadth of the band of rocks but in no place examined was the percentage high, the richest parts of the rocks averaging probably about five per cent. The crystals stand well out on the weathered surface of the rock and are often attached to it by a very small part of their under surface.

Corundum
discovered
in South
Sherbrooke.

Size and
color of the
Crystals.

Corundum-bearing Anorthosite.

Thin sections were made of specimens of the rock, and on examining these under the microscope they were found to consist largely of a basic plagioclase felspar together with some green hornblende. Mr. William Lawson, B.A.Sc., kindly made a chemical examination of the rock for me. He also analyzed the plagioclase and hornblende after they had been separated from the powdered rock mass by means of a heavy solution. On analysis the rock proved to be anorthosite, but of a more basic character than the typical varieties of this rock on which much work has been done by officers of the Canadian Geological Survey and others. The felspar in the South Sherbrooke rock was found to be bytownite with the formula Ab_1An_4 , while the felspar in the normal anorthosites is more acid in character, being typically labradorite.

The only anorthosite or plagioclase felspar rock the writer has seen described which agrees in composition with this South Sherbrooke rock is one from Seine river in northwestern Ontario. This rock was described by Dr. A. P. Coleman some years ago.⁶ Dr. Coleman says of this rock: "The results of the analysis show that the anorthosite from the mouth of the Seine is one of the most basic of the

⁶ Fifth Report Bureau of Mines, pp. 99 and 100, and Journal of Geology, Chicago, November-December, 1896. Reprinted in Canadian Record of Science, vol. vii., No. 4, 1897.

NOTE.—Since the above was in type the writer has met with other analyses, made years ago. These taken together with those of the rocks from Seine river and South Sherbrooke show that basic anorthosite is not so rare as has been thought. The two Ontario localities to which reference has just been made are about 800 miles distant from each other.

	Russia. IV.	Ottawa, Ont. V.
Si O ₂	46.54	47.40
Al ₂ O ₃	30.73	30.45
Fe ₂ O ₃	3.23	0.50
Fe O	1.18	....
Mn O .....	....	....
Ca O	15.45	14.24
Mg O	1.35	0.87
Na ₂ O	1.36	2.82
K ₂ O	0.52	0.38
CO ₂ .....	....	2.00
H ₂ O	0.04	Volatile
Sp. Gravity	100.40	98.96
	2.73	

IV. Analysis quoted by F. Zirkel, Tschermak's Min. Mitt., 1871, page 62. The rock is described as being composed of anorthite and hornblende in the proportion of 90 of the former to 10 of the latter.

massive rocks, and it is possible that the low silica contents and the fact that it consists essentially of anorthite instead of labradorite would justify a separation under a distinctive name; but there seems little doubt that numerous intermediate rocks, such as that from Bad Vermillion, link it to the typical anorthosite of the Province of Quebec. On the whole it will be wiser not to add another name to the rapidly growing burden of the lithologist; for it is clear that these rocks are not definite species, but shade into each other just as the plagioclase felspars do. Possibly a binomial nomenclature like that tacitly admitted in the classification of other rocks, such as the granites, might be adopted, the typical anorthosite being called labradorite anorthosite, that from Bad Vermillion bytownite anorthosite, and the rock from the mouth of the Seine anorthite anorthosite."

The following analyses will show the close resemblance there is in chemical composition between the South Sherbrooke anorthosite and that described by Dr. Coleman from the mouth of the Seine (p. 227).

Anorthosites of Ontario and Quebec.

Judging from the general appearance of some varieties of the rock from Eastern

V. The analysis is by T. Sterry Hunt, who thus describes the specimen examined: "A greenish-white granular variety of anorthosite rock, from a boulder near Ottawa, having a density of 2.73. This is a portion of the specimen upon which Dr. Thompson founded the species named by him bytownite. . . The rock is coarsely crystalline and made up of black hornblende, with a little sphene, and a white triclinic felspar, the cleavage surfaces of which are sometimes half an inch broad, and beautifully striated." Geology of Canada, 1863, page 79.

Most writers state that labradorite is the essential constituent of what they call the typical anorthosites. It would seem that this is owing to the fact that few analyses have been made of these rocks. Moreover, it may be said that only comparatively restricted areas have been examined. The most of Hunt's analyses and those of other workers on this continent were on samples from the district in Quebec which lies adjacent to the St. Lawrence river, and from the adjoining region in the United States to the south. The assumption that labradorite is the typical felspar of those rocks may moreover be due to the fact that most of the areas of anorthosite to which attention has been directed are of large size, and thus, for various reasons, would on the whole be more acidic in character than smaller outcrops. From the analyses which have been quoted by the present writer from Ontario and Russia, it would seem that no one plagioclase should be considered the typical constituent of these rocks.

Rosenbusch (Elemente der Gesteinslehre, pages 151 and 153) quotes four analyses of anorthosites; Kemp (Handbook of Rocks, page 49) three, and Adams (N. J. Fur. Min. 1893, page 494) two. These range in percentage of silica from 53.42 to 59.

Ontario albite anorthosites also occur associated with the corundum-bearing group.

	I. Seine River.	II. South Sherbrooke.	III. Rawdon, Que.
SiO ₂	46.24	47.32	54.45
Al ₂ O ₃	29.85	30.36	28.05
Fe ₂ O ₃	1.30	1.35	0.45
FeO	2.12	1.55	.....
MnO	trace	.....	.....
CaO	16.24	15.45	9.68
MgO	2.41	2.44	.....
Na ₂ O	1.98	1.88	6.25
K ₂ O	0.18	0.66	1.06
C ₂ O	1.03	0.58	.....
H ₂ O .....	.....	0.10	0.55
Total	101.35	101.69	100.49
Sp. Gravity ..	2.85	2.73	2.69

The following analyses, made by Mr. Lawson, show the composition of the two constituents of the South Sherbrooke anorthosite. For comparison the theoretical composition of a plagioclase, Ab₁ An₄, quoted by Zirkel⁷, is given, as well as the composition of a hornblende from hornblende gabbro quoted by Rosenbush⁸.

	Bytownite.		Hornblende.	
	I.	II.	III.	IV.
SiO ₂	48.12	48.03	41.40	39.58
TiO ₂ .....	.....	.....	.....	trace
Al ₂ O ₃	34.54	33.43	15.39	14.91
Fe ₂ O ₃	0.36	.....	7.01	4.01
FeO .....	.....	.....	7.17	10.67
MnO .....	.....	.....	trace	trace
CaO	16.30	16.28	12.53	11.76
MgO	trace	.....	10.31	13.06
K ₂ O	0.15	.....	1.56	0.62
Na ₂ O	1.91	2.26	3.58	2.87
H ₂ O	none	.....	0.81	2.79
(ignition)	.....	.....	.....	.....
	101.38	100.00	99.76	100.27
Spa. Gravity ..	2.731	2.735	3.188 at 15° C	3217—3222

I. Bytownite from the Anorthosite of South Sherbrooke, Ont.

II. Bytownite, Ab₁ An₄, given by Zirkel.

III. Hornblende from the Anorthosite of South Sherbrooke.

IV. Hornblende from a Hornblende Gabbro, quoted by Rosenbusch.

It will be seen that there is a remarkably close agreement between the theoretical composition of bytownite, Ab₁ An₄, as regards the percentages of the silica, lime and alkalies and that of the felspar from the South Sherbrooke rock. The proportion of alumina in the latter is however over one per cent. higher than that of the theoretical percentage. This may be due to the presence of a small amount of corundum embedded in the felspar in a very fine state of division, as this mineral occurs, as has been stated, in parts of the rock. None of it was identified

however, either by megascopic or microscopic examination, in the specimen analyzed. In thin sections under the microscope the felspar is seen to contain numerous crystal-lite-like inclusions. It is possible that some of these are corundum.

The hornblendic constituent of the anorthosite is seen by the analysis to have the composition of the typical variety, or what is called common hornblende.

Oso in Frontenac County.

From the boundary of the township of South Sherbrooke the belt of corundum-bearing anorthosite runs westward into the adjoining township of Oso in Frontenac county. During the little time I spent in this township however I did not succeed in finding the belt so well defined as in South Sherbrooke, although corundum was found in the rock in situ at two or three places and anorthosite boulders carrying corundum were found lying south of a line which runs several miles to the west, thus showing that the belt continues for a considerable distance across country.

As only a hurried walk was made through this part of the township the location of the outcrops of rock and the distribution of the corundum-bearing glacial boulders can be only approximately stated. This is owing also in some measure to the fact that some of the streams and small lakes were found to be incorrectly laid down on the township map. In a general way it may be said that the belt of corundum-bearing anorthosite enters Oso near the northern edge of Rock lake, which lies at the boundary of the townships of South Sherbrooke and Oso. This is near lots nine or ten in the seventh and eighth concessions. From this point the belt, judging from the position occupied by the glacial boulders, runs southwestward about midway between the southern edge of Sharbot lake and the northern extremity of Crow bay, which is an extension of Bobb's lake. No clearly defined belt was found here, but considerable rock in place resembled that farther east, and this rock crosses the Kingston and Pembroke railway a short distance south of Olden station. Just east of the railway

⁷ Petrographie, 2nd edition, page 221.

⁸ Elemente der Gesteinslehre, page 148.

track the rock was found to be associated with crystalline limestone. At the side of a spring which has been fitted up with a curb, and which is situated just over the fence on the east side of the track near some farm buildings, there is a boulder which carries the characteristic light colored corundum of the district. A little to the south-east of these buildings and along the wagon road to the east numerous similar boulders occur, scattered over the surface of the ground. Down the track a mile or more south of Olden station other boulders which carry corundum occur. All the boulders referred to are rather dark in color on weathered surfaces, but have a somewhat characteristic appearance, due to a bluish or purplish shade of color, which can be made out when some distance from them, and thus serves to distinguish them from the boulders of "trap" and other dark colored varieties of rock which are associated with them.

West of the railway track the belt runs towards the north end of Eagle lake, of which the greater part lies in the north-east corner of the township of Hinchinbrooke. A boulder carrying corundum was found at the roadside about one mile north of the village of Parham, which is situated to the southwest of the lake. As none of the rock was found in place around the north shore of the lake, it would appear that the belt runs through the lake or along its southern edge. The rock may be in place on some of the islands of the lake, which time did not permit us to examine. This belt is likely continued to the southwestward of Eagle lake, and other outcrops of the corundum-bearing variety will likely be found in place here if a careful examination be made of the territory.⁹

The Parham Gabbro Area.

The track of the Kingston and Pembroke railway runs through some "cuts" just north of Parham station. The rock in these is very coarse grained and dark in color, and on microscopic examination is seen to belong

to the gabbro family. The chief constituents of the rock are basic plagioclase and pyroxene. The pyroxene consists in some specimens of both diallage and hypersthene, so that it would be as proper to call the rock a norite as a gabbro. Both the diallage and the hypersthene contain the inclusions characteristic of these minerals. The inclusions here are however striking on account of their comparatively large size, and have been referred to in a paper published some three years ago.¹⁰

Other minerals occurring in subordinate amounts in this gabbro are biotite, apatite, magnetite and pyrite, besides other accessory constituents of less prominence. Stringers of quartz of secondary origin are also sometimes present. An interesting fact in connection with part of the gabbro is that some of the basic plagioclase on microscopic examination is found to be altering into scapolite, as shown in Fig. 3. This mass then represents a stage in the alteration of gabbro into the scapolite rocks which are so characteristic of some parts of the region under consideration. In the typical scapolite rocks the essential constituents are scapolite and secondary hornblende. The former mineral as stated is believed to come from plagioclase, and the latter appears to be derived from pyroxene by alteration. In some varieties of the scapolite rocks, which will be hereafter referred to in speaking of some of the iron ore deposits, none of the plagioclase or pyroxene remains unaltered.

Part of the gabbro mass just north of Parham station lies to the east of the railway track and part of it extends westward to near the shore of Eagle lake.

The phosphate deposit known as the Boyd Smith or Eagle lake property lies at the edge of the mass and near the shore of Eagle lake. This deposit has been described in the Report of the Royal Commission on the Mineral Resources of Ontario, 1890. While most of the phosphate has been mined at the edge of the igneous mass, still some outcrops of the mineral are surrounded by the gabbro

¹⁰ W. G. Miller and R. W. Brock, *Canadian Record of Science*, Oct., 1895.

⁹ Since the above was written outcrops of pink syenite-pegmatite carrying corundum have been found some miles to the southwest, in the township of Hinchinbrooke.

with no other rocks intervening. A considerable amount of titaniferous magnetite also occurs on this property in the gabbro, and some of the ore has been blasted out. This magnetite, like other titaniferous varieties, carries a small amount of nickel and cobalt.¹¹

One specimen was found to contain 0.1974 per cent. of the metals. A fine grained variety from the same deposit was found to contain 0.5648 per cent. of nickel and 0.2622 per cent. of cobalt. Samples of pyrite in association with the gabbro on the same property gave 1.6785 per cent. of nickel and 0.9847 per cent. of cobalt. All these analyses were made by Mr. F. J. Pope, M. A., late demonstrator in the Kingston School of Mining.

Scapolite Rocks.

As has been stated, some of the basic plagioclase in the Parham gabbro mass can be seen, when the rock is examined in thin sections under the microscope, to be more or less altered into scapolite. There are other large masses of the rock in the district in which the plagioclase appears to have been completely altered into scapolite and the pyroxene into hornblende. Again there are masses of gabbro-like rocks intermediate in mineralogical composition between the Parham mass and these masses in which the felspar is represented entirely by scapolite. Many of these scapolite-bearing rocks are

found in association with iron ore deposits. Very often the scapolite rock forms one wall of the ore body while the other wall consists of usually somewhat impure crystalline limestone. A deposit of this character is that known as the Glendower mine, near Bedford station on the K. & P. railway. Here the foot wall of the deposit is a scapolite rock which in the field has the general appearance of a somewhat coarse gabbro, but when examined in thin sections under the microscope the light colored constituent is seen to consist almost entirely of scapolite, with some calcite, while the dark constituent is hornblende. See Fig. 4.

The scapolite rock is much freer from oxides of iron than is ordinary gabbro, and it

would seem as if in the process of alteration of the gabbro, now represented by the scapolite rock, the iron oxides had been leached out and deposited from solution, thus giving rise to the iron ore body.

In his description of the corundum district of Burma Prof. J. W. Judd¹² states: "The study of the Burma limestones leads to the conclusion that the basic gneisses may undergo a corresponding metamorphosis, the breaking up of the lime-felspar leading to the formation of an unstable scapolite, from which and from other unstable minerals originate, as a consequence of further change, the calcite and dolomite." It may be added that in Eastern Ontario it is possible that some of the crystalline limestones which are so intimately associated with scapolite rocks, which latter are alteration products of igneous rocks, may represent the extreme forms of the alteration of these igneous rocks.

The scapolite rock from the Robertsville mine, which forms one of the walls of the magnetite deposit, in mineralogical composition stands between the Parham gabbro and the scapolite rock of the Glendower mine. It consists essentially of scapolite, plagioclase, both of which occur in large amounts, and hornblende. The microscopical characters of this rock were described some years ago by Dr. F. D. Adams and Dr. A. C. Lawson.¹³

Corundum in other Countries.

In last year's report, p. 213, a brief account was given of the modes of occurrence of corundum and emery in different countries. Since the publication of that report two important monographs have appeared on the subject. For a copy of one of these I am indebted to Dr. T. L. Walker of Calcutta. This valuable report on the corundum deposits of India, consisting of 79 pages, is by Mr. T. H. Holland.¹⁴ The other publication referred to is by Josef Morozewicz, and deals with the artificial pro-

¹² The Rubies of Burma and Associated Minerals. Phil. Trans. Roy. Soc. London, vol. 187, p. 205.

¹³ Can. Rec. Science, 1889, page 198.

¹⁴ A Manual of the Geology of India, Economic Geology, part I, Corundum by T. H. Holland, A.R.C.S., F.G.S., Deputy Superintendent Geological Survey of India, 1898.

¹¹ Seventh Report Bureau of Mines, pp. 230 to 232.

duction of corundum and other minerals in magmas.¹⁴ A brief account is also given of the modes of occurrence of corundum in Russia. The volume consists of reprints of articles from an Austrian periodical, and I am indebted to the kindness of the author for a copy of it.

In India.

As corundum occurs under many forms in India, and some of its modes of occurrence there are similar to those under which the mineral occurs in Ontario, it seems advisable to give a brief review of Mr. Holland's paper in this report.

In the introduction to his report Mr. Holland states that, "The Indian Empire can with very good reason be claimed

The home
of Corun-
dum.

as the home of corundum. The name corundum—under which the

dull-colored and non-transparent forms of natural alumina have generally been known since the introduction into Europe of a large number of Indian specimens towards the end of the last century—is only a modified form of the Sanskrit word *korund*. Not only are there large deposits in India of the common form of this mineral, . . . but the most highly prized specimens of its transparent red variety, the ruby, have been obtained from the famous mines of Burma, whilst the mines of Kashmir are noted for the size and transparency of the blue variety, sapphire."

Mr. Holland does not deal with corundum as an ore of aluminium, as he states that the high price of the mineral for abrasive purposes at the present time, in addition to there being no processes as yet devised for the extraction of the metal from the mineral, prevent corundum from entering into competition with other ores which contain a lower percentage of the metal but can be sold at a lower price.

An interesting account is given of the views which have been held concerning the charac-

ter and relations of corundum in the mineral kingdom. Reference is made to the supposed magical and medicinal properties of the gem

Supposed
Medicinal
and Magical
Properties of
the Gem
Varieties.

varieties. It is stated that the ruby and sapphire, known as "perfect corundum," were prized by the ancients "for their beauty and supposed efficacy in medicine or magic." A quotation is given from an ancient author by whom the mineral is called *hyacinthus*. "This is the gem that feels the influence of the air and sympathizes with the heavens, and does not shine equally if the sky be cloudy or bright. Besides, when put in the mouth it is colder than other stones. For engraving upon indeed it is by no means adapted, inasmuch as it defies all grinding; it is not however altogether invincible, since it is engraved upon and cut into shape by means of the diamond." Even at the present time, Mr. Holland states, the mineral is thought by the natives to have a medicinal value. "Like many minerals common corundum is used in India for medicinal purposes. The hakims (native doctors) of the Punjab use calcined corundum as a cooling medicine in fevers (dose about 16 grains). They also apply it to wounds to stop bleeding." In fact mythical properties innumerable seem to have been attributed to the common and gem varieties of the mineral. Rubies of certain quality were believed to concern the life, death, wealth, poverty, success, failure, humiliation, exaltation of their owners. Stones of certain character were believed to subject their possessors to lightning strokes, to blows from a weapon, or to loss of domestic animals. To the sapphire among other properties was attributed the power of extinguishing fire, and of curing fever, inflammation and evil passions. It may be added that this belief in the supernatural powers of gems and other inanimate objects is not confined to eastern nations. Even among ourselves at the end of the nineteenth century there are some who consider it ill luck to possess or wear certain gem stones, and everyone has heard of men who carry horse chestnuts in their pockets or wear lead rings as a preventative of rheumatism!

Mr. Holland states, p. 10, that "There seems to be no *a priori* reason why corundum, Theory of when occurring as a rock constitu- Mr. Holland. on Origin. ent, should require any different explanation than that generally applied to

¹⁴ Experimentelle Untersuchungen über die Bildung der Minerale im Magma von Josef Morozewicz in Warschau. Separat-Abdruck aus Tschermak's Min. und Pet. Mitt., Band XVIII, Heft 1 und 2. Wien.

the other simple oxides occurring in a precisely similar manner." This agrees with the opinion expressed by the present writer in last year's report. Mr. Holland further states that until recently the known occurrences of corundum in situ were few, and this may account for the tendency there has been to regard the origin of corundum as due to unusual or secondary circumstances, its production having been thought to be due to the action of mineralizing agents or other causes affecting the aluminous rocks in which it occurs. "The principal Indian occurrences of corundum in situ can be divided into two classes: (1) Those in which corundum is associated with basic rocks, and (2) those in which its associates are distinctly siliceous (acid). Both classes are well represented in India, but in most cases where corundum has been found associated with basic rocks intrusions of pegmatite have also been found in the neighbourhood." The basic rocks have pyroxene as a predominant constituent. With it are associated hercynite, ruby, spinel, pleonaste, magnetite, ilmenite, corundum and other minerals. Corundum also occurs in crystalline limestones, and it has been shown that these limestones are intimately associated with pegmatite, this association of the rocks being a constant feature of the Madras corundum deposits. In view of Prof. Judd's conclusions these limestones are regarded as extreme forms of the alteration of rocks which are now generally regarded as igneous in origin. "It seems appropriate to link with them (the limestones) the anorthite rock containing corundum in the Salem district of Madras. Although the anorthite matrix was the first described amongst the occurrences of corundum, this association appears to be rare, possibly because the anorthite has in many cases been changed to carbonate of lime."

In connection with the Ontario occurrences of corundum the fact has been mentioned that corundum has been found in a basic anorthosite, a rock very similar in character to the corundum-bearing anorthite of India. No occurrences in this Province are however known which resemble those of India in which

corundum is found in highly pyroxenic rocks, or in their altered representative the crystalline limestone. Attention has been drawn however, both in the present report and that of last year, to the frequent association of quartziferous pegmatite with the corundum bearing rocks of the Province. It has also been stated that the corundum-bearing rocks of Ontario are, in the majority of cases examined, closely associated with crystalline limestones.

"The sapphires of Kashmir occurring in a granite, form a good example of the occurrence of corundum in rocks of acid composition."

In Ontario corundum has not been observed in granite, but the more acidic varieties of syenite which contain the mineral appear, as has been stated, to pass into granite in some cases.

Burma.

In Burma, which is celebrated for its rubies, the principal mines are those in which the stones are found in crystalline limestone, hill-wash, or in alluvium.

In one small area in Upper Burma there are ten distinct bands of crystalline limestone in a distance at right angles to their strike of $2\frac{1}{2}$ miles. Their collective thickness across their outcrops is about 2,670 feet. The gem stones are obtained by washing the detrital matter produced by the weathering down of the limestone. "The limestone itself has also been quarried for the rubies occurring in situ, but the shocks produced by blasting and subsequent hammering of the rocks invariably injure numbers of the gem-stones." At one point in the Coimbatore district "two rocks of different composition and structure are connected with the appearance of corundum . . . The one is the pale gray elaeolite syenite of the Sivamalai Hill, and the other a coarse felspar-rock intruded as veins into the former rock." The latter rock is composed of red or deep flesh-colored plagioclase and biotite in large nests of small plates. It is in this rock that the corundum occurs, and it appears to be an original constituent of the rock. Although

corundum occurs in a rock here which is associated with elæolite or nepheline syenite, the mineral has apparently not been found occurring in the latter rock in India. The same

Unique occurrence of Corundum in nepheline syenite in Ontario.

appears to be true of all other countries, including particularly the Ural mountain district of Russia and other districts in which both corundum and elæolite syenite occur. Judging from the descriptions of the occurrences of corundum in these countries which have so far been published, Ontario is the only country in which corundum has been observed to occur in elæolite (nepheline syenite). In this Province numerous occurrences have been observed by the present writer in which the mineral is embedded in syenite of this character.

In the Salem district corundum occurs under conditions very similar to those which have been stated by the present writer to prevail in the deposits of this mineral in the township of South Sherbrooke. Mr. Holland describes the rock as "consisting of anorthite (indianite) and hornblende chiefly." The specific gravity of a specimen with but little hornblende was found to be 2.824. The corundum is of a "pale, greenish-gray, rarely flesh colour, and occurs sparsely distributed" among the parts of the rock which has a gneissoid structure, which are richer in anorthite. "It takes the form of irregular lumps averaging from one-quarter to one inch in diameter. The crystals do not, as a rule, show the prismatic and pyramidal faces . . ."

This description of the mineralogical composition of the rock and the form and color of the contained corundum applies very well to the occurrence in South Sherbrooke.

In the Salem district, as in the other corundum areas of India, one of the characteristic features is the occurrence of dikes of coarse granite or pegmatite, and reference is also made to the occurrence in this district of dikes of a dark compact trap, both of which rocks are frequently found in the neighbourhood of the Ontario corundum deposits.

Paparapatti Area.

In the Paparapatti area corundum occurs in the solid rock, and since this is one of the

few localities in India in which attempts have been made to work such deposits in order to extract the mineral for abrasive purposes it may be well to give Mr. Holland's description of the occurrence, with his conclusions as to the economic value of the deposits. This will be of some assistance in estimating the relative importance of the Ontario deposits

"The actual matrix of the corundum in this area occurs as bands of lenticular masses, of principally deep flesh-colored orthoclase (finely crystalline, and showing under the microscope a fine micropertthitic or cryptopertthitic inter-growth of possibly plagioclase) in which there is often a considerable proportion of sillimanite (fibrolite), rutile, opaque black and green spinel, with biotite, which last is especially developed at the periphery of each lenticle. The size of these lenticles is sometimes as much as fifteen feet long and eight feet across where actually seen in the rock. The corundum here differs entirely in appearance from that of Sittampundi. It is of a deep purplish brown or sometimes dark greenish-gray colour, and is always regularly crystallized into hexagonal prisms with a great number of variously inclined pyramidal faces imperfectly developed, and so giving the prism an elongated barrel or even spindle shape.

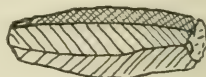


Fig 5. Crystal of Corundum showing the curved faces due to alteration of the prism and pyramid, as well as traces of the rhombohedral parting planes. Paparapatti area, Salem district. Natural size (after Holland).

"In size they vary from extremely minute grains and crystals, only visible in a microscopic section, to large crystals several inches long and from one-fourth to one inch in diameter. The characteristic parting planes parallel to the rhombohedron are easily made manifest by breaking the crystals, and sometimes traces of these planes are visible on the prism faces (Fig 5). Occasionally also a combination of the rhombohedron and prism may be seen in a single crystal. Each crystal is surrounded by a shell of purer orthoclase,



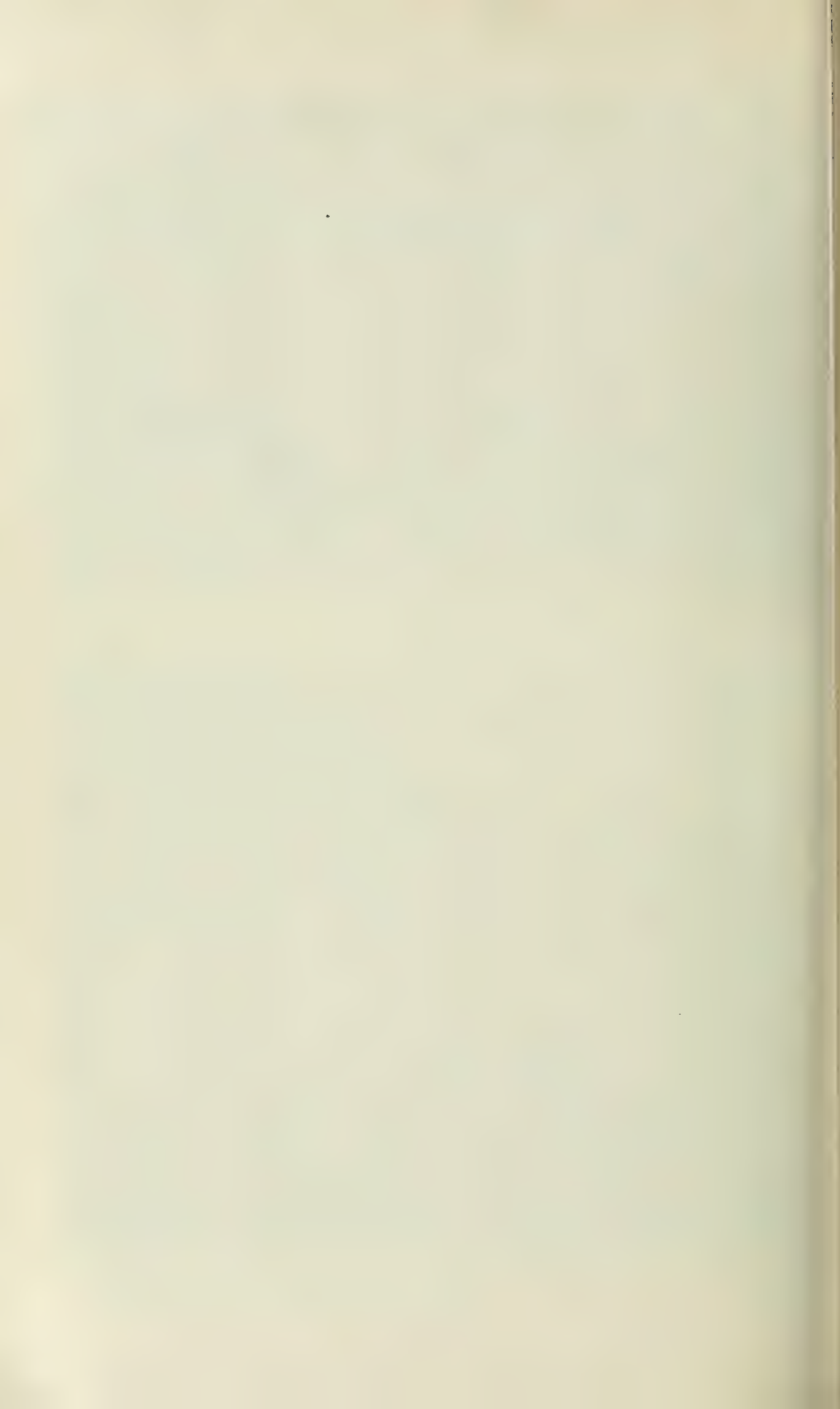
Rapids above High Falls, York Branch River.

W. K. George.



High Falls on York Branch River, from a point above the Falls.

W. K. George.





At the foot of High Falls on York Branch River

W. K. George.



34 Second Falls on York Branch River at Bronson or Lancaster Farm (18 ft.)

Harris



View on the York Branch River.

Harris

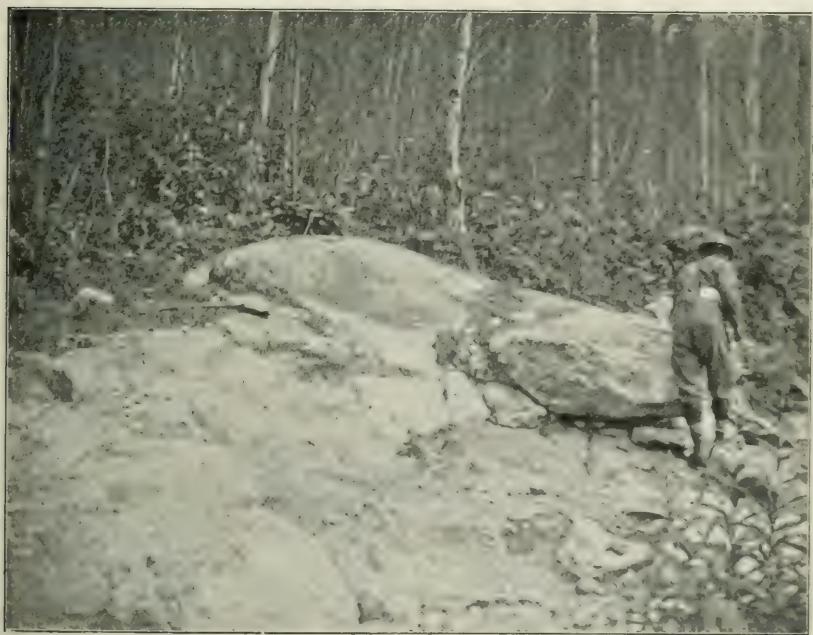


Foster's Rapids on the York Branch River

-Harris



Corundum-bearing rock on Robillard's farm, lot 3, con. 18, Township of Raglan Harris



Corundum-bearing rock on Robillard's farm, lot 4, con. 18, Township of Raglan Harris

generally flesh-coloured, but sometimes white, having a thickness of from one-fourth to one-eighth inch. When a corundum crystal has been broken out or has dropped out from the rock, the place where it lay can always be distinctly recognized by this shell which remains behind. Microscopic examination shows that this shell differs from the remainder of the matrix in the absence of minute corundums, sillimanite and most of the accessory minerals.

"It is clear from the map that the outcrops of the rock in which corundum occurs lie in successive lines, roughly parallel to the strike of the gneiss, namely, N.N.E.—S.S.W.

"This conclusion has since been confirmed by the discovery of corundum occurring under precisely similar conditions in the Hosur taluk to the north, and also in the same line to the south, making the corundum-bearing band over 24 miles long. This fact, and the circumstance that the mineral occurs in two and probably more parallel bands of slightly different rocks, make the Paparapatti area a decidedly promising one. Experiments to test the prospect of mining for corundum along this band have been conducted by Mr. C. S. Middlemiss, on a lenticle $13 \times 8 \times 9$ feet, near the village of Erranhalli, $2\frac{1}{2}$ miles S.W. by S. of Palakod. It was found that 722 cwt. of matrix-rock yielded 2,845 lb. or nearly 3.5 per cent. of pure corundum, at a cost of R 385-2-0, that is at 8 annas per cwt. of rock broken up and 3.9 lb. of corundum cleaned.¹⁵ As the chief expense was incurred by the mere labor of crushing the rock, which was done entirely by hand, it is certain that the cost of extracting the corundum would be greatly reduced if stone crushing and washing machinery had been employed, as of course would be the case in actual mining operations on a large scale."

Relative Richness of Ontario and India Deposits.

Since Mr. Holland—who is in a good position to judge on account of the fact that more work has been done on corundum in India than in any other country—considers the area just described a decidedly promising one, I have

Advantages
of the
Ontario
corundum.

thought it well to quote his description fully, both as to the characteristics of the mineral itself and as to its mode of occurrence, so that comparison might be instituted between these deposits and those of Ontario.

Since in order to work either the India or Ontario deposits on a large scale would require the use of machinery, the cost of mining and crushing the rock in the two countries may be taken as being practically the same. In so far as climatic influences, transportation facilities, water for washing the crushed material and for use in generating power, electric or otherwise, are concerned, the Ontario deposits are certainly as well situated as any in the world.

The chief constituent in the India rock, as in that of Ontario, is felspar. But in addition to the felspar the India rock contains often a considerable proportion of fibrolite, rutile and spinel. These minerals are heavier than felspar and have specific gravities of, respectively, 3.23 to 3.24, 4.18 to 5.2. 3.5 to 4.1, that of the felspar being 2.57. On washing away the felspar these minerals would tend to come down with the corundum, which has a specific gravity of 3.95 to 4.10, and would thus give an impure product. Mica occurs in the rock from both districts, and hence this mineral may be left out of consideration in making a comparison of the treatment of the two. The heavy mineral which comes down with the Ontario corundum on washing is magnetite, but this mineral is easily and cheaply isolated by passing the mixture over a magnetic separator. Moreover the magnetite, which averages about four per cent. of the rock treated and is of good quality, is in itself a by-product of value for use as an iron ore.

In the mill tests of the Hastings rock made last year by Prof. DeKalb, the corundum obtained from one sample of 550 lb. represented 12.74 per cent., and in another sample of 1250 lb. the corundum separated was 15.50 per cent. of the rock treated.¹⁶ Since the India rocks yielded only 3.5 per cent. of pure corundum, the Ontario deposits would seem to have a considerable advantage over

¹⁵ 8 annas—about 11 cents. The cleaned corundum therefore cost 2.82 cents per pound.

¹⁶ Seventh Report Bureau of Mines, p. 246.

those of India as regards the percentage of mineral in the rock from the two districts.

As stated in last year's report, p. 225, it is difficult to get much information from Government reports concerning the percentage of corundum carried by the rock in deposits which have been worked. The United States reports state that the producers of the mineral are averse to giving information concerning the corundum industry. The percentage quoted from the India report and two others given in a United States report are the only ones the writer has met with. In the latter report one vein from two to six feet wide is said to average 15 per cent. corundum. The material of another deposit in which the vein is from four to 15 feet wide is said to average probably 10 to 15 per cent. corundum.¹⁷ It would thus seem that the Ontario rock contains at least as high a percentage of the mineral as do the deposits with which it will have to compete if worked.

Judging from the characteristics of the India corundum given in the description which has been quoted, the quality of the Ontario mineral is not inferior for abrasive purposes. In fact much of the mineral in the deposits of this Province appear to be of a superior quality to that of the Paparapatti district. The parting planes in the India corundum seem to be more perfectly developed than they are in much of the Ontario mineral, and for abrasive purposes it is desirable that they be not well developed.

With regard to the extent of territory over which deposits are found in the two districts under consideration, there does not seem to be much difference. Mr. Holland states that the mineral has been found along one band which is about 24 miles in length, and that there are two and probably more parallel bands of somewhat similar character. In Ontario corundum has been found, as has been stated in this report, in three different bands or belts of rock. These belts taken together have a length of about 100 miles.

The lenticles or deposits in which the Indian corundum occurs are stated by Mr. Holland to be "sometimes as much as 15 feet long by eight feet across where actually

seen in the rock." From the descriptions which have been given of the surface measurements of some of the Ontario deposits, such as the York river deposits and others, it will be seen that those of this Province are, to say the least, not smaller than those of the India district which is under consideration.

Corundum Rocks of India.

In summing up the geological characteristics of the India corundum region, Professor Judd says:¹⁸ "In all these districts (in Southern Asia) the rocks containing corundum appear to be highly crystalline gneisses, sometimes passing into schists, and frequently including masses of limestone and dolomite, the latter rocks being as a rule highly crystalline, and containing many silicates and other minerals. Intrusive masses of granite or pegmatite also occur. There is no evidence, so far as I am aware, opposed to the view that the whole of these rocks must be regarded as of Archæan age." From the descriptions which have been given in this report and in that of last year of the Ontario corundum region it will be seen that there is a strong resemblance between the rocks of the two regions. The similarity is not less strong when we consider the occurrence of certain special rocks of the two regions, such as the nepheline syenite and the scapolite gneisses.

In the Ontario region however the corundum occurs as an original constituent of igneous rocks, while in India most of the corundum, including the gem varieties, occurs in crystalline limestones and is a product of metamorphism.

In Russia.

Reference was made in last year's report to the occurrence of corundum in Russia, and a little was said of the characters of the rocks with which the mineral is associated in that empire.

Morozewicz, in the excellent monograph to which reference has been made, and which

¹⁸ The Rubies of Burma and associated Minerals by C. Barrington Brown and J. W. Judd. Trans. Roy. Soc. London, 1896, p. 191.

¹⁷ Mineral Resources, U.S., 1893.

was published during the winter of 1898-9, in addition to describing the interesting results of his experiments on the artificial production of corundum, gives an account of the modes of occurrence of the mineral in some of the Russian localities visited by him. As in these localities the mineral occurs under conditions similar to those under which it is found in Ontario, it will be well to mention in this report some of the characteristics of the corundum-bearing rocks of Russia described by this author.

Corundum-Anorthite Rock.

The variety of corundum-bearing rock of Russia which has attracted most attention is that in which the mineral occurs associated with anorthite. This rock occurs in stocks or very large dikes. It is associated with granite and serpentine, which lie on either side of it at the locality on the river Borsowka. The rock at this locality is medium to fine grained in texture, and is made up of crystals of corundum scattered through a gray ground mass in which occur plates of biotite. The finer grained varieties of the rock have at times a gneissoid structure. In some cases the corundum occurs in long hexagonal crystals, and in others it occurs in small pyramidal forms. Fresh specimens show no trace of alteration products, such as calcite or chlorite. Varieties of rocks, differing in the size of the grain, are seen in thin sections, when examined under the microscope, to possess the same constituents but in varying proportions. The gneissoid variety contains the most biotite, while the finest grained contains more secondary material. The chief constituents of the rock are corundum and anorthite, together with spinel and biotite. Apatite and zircon occur as accessory constituents. The secondary minerals present are muscovite, chlorite, kaolin and chrome iron ore. The following is the order in which the primary constituents have crystallized out of the magma, viz.: zircon, spinel, corundum, anorthite, biotite. It is claimed by Morozewicz that the corundum-anorthite rock forms a new type of an aluminosilicate magma and is called "kyschtymit" by him.

The Ontario corundum-plagioclase rock which has been described in this report is similar in character to this Russian rock, the chief difference between them being that the felspar in the specimen of Ontario rock analyzed was somewhat more acid than that of the Russian variety, and in place of the biotite of the Russian rock the corundum-anorthosite of this Province contains hornblende.

It would seem that instead of introducing the name "kyschtymit" for the corundum-anorthite rock of Russia, it would be better to use the name anorthosite, which has long been used by Canadian geologists and others for igneous rocks whose characteristic constituent is a plagioclase.

Corundum-Orthoclase Rocks of the Urals.

In addition to the basic or anorthite corundum-holding rocks just described, other rocks of a more acidic character occur in the Urals. The varieties of these latter rocks which carry corundum contain as their chief constituent, in addition to this mineral, acidic felspar or orthoclase.

Morozewicz makes two divisions of these orthoclase rocks, the coarse grained being called corundum-pegmatite and the finer grained corundum-syenite. The rocks occur as dikes or masses in gneiss. The corundum occurs in them in large as well as in very small microscopic crystals.

In hand specimens the pegmatite is seen to consist of coarse grains of yellowish orthoclase through which penetrate long hexagonal crystals of blue corundum. The crystals of orthoclase often show Carlsbad twinning. Secondary white mica often shows on the surface of the corundum crystals. The length of the corundum crystals reaches 10 centimeters (about 4 inches) and their diameter is about one centimeter. The small crystals seen in thin sections under the microscope have a length of 1 to 1.5 mm., and a thickness of 0.5 mm. The small crystals are characterized by the possession of pyramidal terminations, a feature which was not observed in the large ones. Again the small crystals are perfectly colorless, while the large ones possess a clear

blue color. The small crystals are completely enclosed in orthoclase.

The orthoclase is almost exclusively developed into micro-perthite. Numerous stripes of albite are mixed through the mass of the orthoclase. In addition to corundum, the orthoclase encloses in its mass hairs of rutile and short needles of apatite and zircon. Products of weathering are represented by kaolin, and limonite is also present. A mineral which occurs in small, black, opaque, glistening prisms in both the orthoclase and corundum is present, but its true character was not made out by Morozewicz.

In describing the corundum-syenite the author states that a rock made up of a granular mixture of corundum, orthoclase and biotite is not seldom met with in the Urals. The rock occurs in granite in the form of stock-like segregations (Anhaufungen). Some of these occurrences are poor in biotite, while others are pretty rich in the mineral. The corundum in rock of the former kind is in short prismatic blue crystals, while in the latter kind the mineral occurs in broad dark gray plates. In both cases the corundum may be looked on as playing the part of quartz in granite. If the corundum in the syenite were changed to quartz the rock would become a typical granite.

Judging from Morozewicz' description of the corundum-bearing rocks of Russia it would seem that corundum has not yet been found occurring in that country in nepheline syenite. With this exception the occurrence of the mineral in the igneous rocks of the two countries, Russia and Ontario, shows a close parallel. It is altogether likely that further search will prove that the mineral does occur in nepheline syenite in Russia, since this rock is known to be associated in places with the corundum-bearing varieties. As has been shown by an analysis quoted in this report, some of the rocks of this Province which in hand specimens would not be considered to contain nepheline do contain this mineral. There is a very gradual passage from one variety of syenite to another.

Since the greater part of known igneous

rocks belongs to alumino-silicate magmas, and since the principal and least varying components of such rocks are silica and alumina, these compounds are taken by Morozewicz as a basis for classification of alumino-silicate magmas. The following divisions are made :

GROUP A.

1. Magmas supersaturated with alumina, e.g., corundum syenite.
2. Magmas saturated with alumina, e.g., syenite.
3. Magmas not saturated with alumina, e.g., gabbro.

GROUP B.

1. Magmas supersaturated with silica, e.g., granite.
2. Magmas saturated with silica, e.g., syenite.
3. Magmas not saturated with silica, e.g., nepheline syenite.

In connection with 3A and B it may be stated that nepheline syenite is saturated with alumina, but not fully saturated with silica.

Morozewicz claims that rocks of the type of 1A, although at present so far as known are of rare occurrence, will be found to occur more widely when search is made for them. The discoveries of corundum-bearing rocks, over such a wide tract of territory which

have been made in this Province in old settled districts within the last three years confirm the author's view.

Rocks of similar character to those of Eastern Ontario are known to occur not only in other parts of the Province, but also in the Province of Quebec, and it seems not unlikely that if searched for corundum will be found over a wide extent of territory along the southern edge of the Canadian Archæan protaxis. Nepheline has been found in boulders in the central part of the Province, the Pic island in lake Superior, and in rock in place in the Rainy River district towards its western boundary, as well as in the eastern part and in the Province of Quebec.

Ontario rocks have considerable magnetite, about four per cent., associated with the corundum, while those of the districts of Russia under consideration carry spinel. But as these are isomorphous compounds the two occurrences may be considered as being closely identical. The percentage of magnesia in most of the Ontario corundum rocks is very low—analysis showing

merely a trace. Zinc spinel however occurs at one or two places in the township of Raglan.

General Conclusions.

As has been stated in the preceding pages, the igneous rocks in which corundum has so far been found to occur in Ontario are of four kinds, viz.: (1) Syenite (mica, etc.), (2) Syenite-pegmatite, (3) Nepheline syenite, (4) Anorthosite. The following table shows which of these corundum bearing varieties are found in India and Russia according to the descriptions given by Holland and Morozewicz :

- Classes of
Igneous
Rocks.
1. Syenite—Ontario, India and Russia.
 2. Syenite-pegmatite—Ontario, India and Russia.
 3. Nepheline syenite—Ontario only.
 4. Anorthosite—Ontario, India and Russia.

It may be added that corundum occurs in another igneous rock in India, viz., granite. This mode of occurrence of the mineral has up to the present not been observed in Ontario, although, as has been stated, the corundum-bearing varieties are sometimes cut through by quartziferous pegmatites, and the corundum-bearing syenite appears to merge off into granite in some cases.

Locations of Ontario Deposits.

The index map which accompanies this report (p 206) shows the locations of the corundum deposits. The distances of the deposits by rail from some of the chief cities of the Province are stated on the map. The extension of the Pembroke Southern Railway from Golden Lake station to Bancroft, for which a Government bonus has been granted, will cross the main corundum belt and will greatly increase the shipping facilities. The Central Ontario Railway is also being extended to Bancroft.

Reference was made in last year's report to the favorable situation of the deposits as regards waterpower, labor and supplies. Excellent waterpowers occur on both the Madawaska and York Branch rivers in the vicinity of some of the main deposits. The district is well able to supply labor and agricultural products, and there is abundance of wood for fuel.

Water-
power,
Labor and
Supplies.

Statistics of Corundum.

As has been previously stated, it is difficult to get reliable statistics concerning the production of corundum. Some Government reports state that the producers are averse to giving information. The Engineering and Mining Journal of New York gives the following as being the amounts of corundum and emery produced in the United States in 1897 and 1898 :

Exact information has
not been
available.

	1897.	1898.
Corundum, tons	296	786
Emery, "	1,900	2,056

The value of the two materials taken together in 1897 was approximately \$112,000 and in 1898 it was \$210,000. The value of emery grains and rock imported into the United States in 1897 was about \$130,000 while in 1898 it was \$133,399. The U. S. Government reports give the total production of corundum and emery in the country in 1898 as being 4,064 tons, valued at \$275,064.

Of other abrasive materials produced the Government reports state that the garnet had a value of \$86,850, and pumice stone \$13,200. Some other materials, such as crushed steel and carborundum, are used quite extensively. The value of the crushed steel produced in 1898 is said to be \$46,200, and of carborundum \$151,444.

The writer was informed by a gentleman who visited the corundum district of North Carolina recently that prospecting for the mineral is being actively carried on in that State, but without much success in the discovery of new deposits. Users of the material have also informed the writer that they have great difficulty in obtaining sufficient supplies of the material. One firm in Great Britain asserts that it has given up trying to secure corundum, and prefers to use high grade emery on account of the difficulty experienced in securing a constant supply of corundum and on account of much of the material supplied under that name being adulterated, or being only imperfectly separated from associated minerals.

Other
abrasive
Materials.

Difficulty of
procuring
Corundum
Supplies.

Prices of Abrasive Materials.

The following list of prices of corundum and other materials used for abrasive pur-

poses is taken from the Engineering and Mining Journal of New York :

Abrasives.	Measure.	Price.
Carborundum grains, f.o.b.		
Niagara Falls	lb.	\$0 10
Corundum, N.C.	lb.	.07 " 10
do. Chester	lb.	.04½ " 05
Emery grains, Turkish	lb.	.05
Pumice stone, Am. powdered.	lb.	.01 3-5 " 02
Rouge	lb.	.17 " 30
Topoli, prepared	short ton.	20 00

The average value of garnet produced in 1898 was \$28.78 per 2,000 lb.

It seems likely that if corundum of good quality were put on the market at a somewhat lower price than at present quoted the result would be that it would displace to a large extent inferior abrasive materials and thus its consumption would be largely increased.

Abrasive Quality of Ontario Corundum.

A quantity of grain corundum produced from rock quarried in the township of Carlow, Hastings county, and milled in the laboratory of the School of Mining, Kingston, was submitted to the Hart Emery Wheel Co. of Hamilton, Ontario, for a test of its abrasive qualities. In a letter to the Director of the Bureau of Mines, dated March 2, 1899, they state in part as follows in reference to the test :

"The tests were made with disks 12" in diameter and from $\frac{3}{4}$ " to 1" in thickness, the small quantity of Hastings corundum procurable preventing the use of larger disks. The wheels were placed on opposite ends of the same arbor; one made of Hastings corundum being placed on one end, the other end being either supplied with North Carolina corundum or carborundum. The speed at which the arbor ran was 1,700 revolutions per minute. The pieces of metal ground in the series of tests were of (1) Brass, (2) Cast Iron, (3) Wrought Iron and (4) Cast Steel, and the trial bars were about 1" by $\frac{1}{2}$ " in size."

The company report having made 23 comparative tests. Four of these were with what they describe as the Hastings "special," but as they do not state what is meant by this term the results of these four tests are not included in the following tabular summary, which shows the results of the other seventeen tests.

1. Comparative Test of Hastings (Ontario) Corundum and North Carolina Corundum on Brass :

Material.	Time of test.	Net ground.	Excess ground.
Hastings	3 hours.	1 lb. 13½ oz.	4 oz.
N. Carolina	3 hours.	1 lb. 13 oz.	

1A. Comparative Test of Hastings Corundum and Carborundum on Brass :

Material.	Time of test.	Net ground.	Excess ground.	Excess lost on weight of wheel.
Hastings C	2 hours.	8 oz.		
Carborundum ..	2 hours.	15 oz.	7 oz.	
Hastings C	1 hour.	11½ oz.		
Carborundum ..	1 hour.	1 lb. 5½ oz.	10½ oz.	

These two comparative tests of Hastings corundum and carborundum on brass cannot be relied on, as will be seen from the figures, both materials being said to grind away more brass in one hour than in two. Moreover the total amount of brass said to have been ground away by Hastings corundum in these two tests, which lasted for a total time of three hours, two hours and one hour respectively, is 1 lb. 3¼ oz. while in the three hours' test already referred to in which Hastings and North Carolina corundums were compared, Hastings is stated to have ground away 1 lb. 13½ oz.

2. Comparative Tests of Hastings Corundum and North Carolina Corundum on Cast Iron.

Material.	Time of test.	Net ground.	Excess ground.	Excess lost on weight of wheel.
Hastings C	2 hours.	2½ oz.		
N. Carolina C ..	2 hours.	4½ oz.	2	
Hastings C	1 hour.	2 oz.		
N. Carolina C ..	1 hour.	3½ oz.	1½	
Hastings C	1 hour.	1½ oz.		
N. Carolina C ..	1 hour.	3 oz.	1½	
Hastings C	3 hours.	8½	5	
N. Carolina C ..	3 hours.	3½		

In these four tests lasting for a period of 7 hours the Hastings corundum ground away 14½ oz. of cast iron, while the N. Carolina ground away 14¼ oz. Judging from the fourth test lasting 3 hours the Hastings wears much better on this material than the North Carolina. This may be owing to the grains of the former material breaking away as the wheel wears down, so as to present constantly a good cutting surface. Some wheels as they wear down show a tendency to become more or less "greasy" on their cutting surface.

2A. Comparative Test of Hastings Corundum and Carborundum on Cast Iron :

Material	Time of test.	Net ground.
Hastings	1 hour.	2½ oz.
Carborundum	1 hour.	2½ oz.

3. Comparative Test of Hastings Corundum and North Carolina Corundum on Wrought Iron :

Material.	Time of test.	Net ground.	Excess ground.	Excess lost on weight of wheel.
Hastings C.	3 hours.	3½ oz.		
N. Carolina C.	3 hours.	4½ oz.	1	½ oz.
Hastings C.	1 hour.	1 oz.		
N. Carolina C.	1 hour.	2½ oz.	1½	

3A. Comparative Test of Hastings Corundum and Carborundum on Wrought Iron :

Material.	Time of test.	Net ground.	Excess ground.
Hastings C.	1 hour.	2½ oz.	
Carborundum	1 hour.	4 oz.	1½
Hastings C.	2 hours.	4½ oz.	
Carborundum	2 hours.	9 oz.	4½

Some of the figures given in tests 3 and 3A are difficult to understand. Working on the same material, wrought iron, and under the same conditions, Hastings corundum in one case is said to grind away 3½ oz. in 3 hours, while in another case it is said to grind away 4½ oz. in 2 hours. In another case Hastings is said to grind away 1 oz. in 1 hour, while in another experiment it is found to grind away 2½ oz. in the same length of time. It will be noted that this latter amount is greater than the amount ground away by N. Carolina in the same length of time.

4. Comparative Test of Hastings Corundum and North Carolina Corundum on Cast Steel :

Material.	Time of test.	Net ground.	Excess ground.	Excess lost on weight of wheel.
Hastings C.	1 hour.	3 oz.	.....	½
N. Carolina C.	1 hour.	3 oz.	.....	
Hastings C.	2 hours.	4½ oz.	1	
N. Carolina C.	2 hours.	3½ oz.		

4A. Comparative Test of Hastings Corundum and Carborundum on Cast Steel :

Material.	Time of test.	Net ground.	Excess ground.	Excess lost on weight of wheel.
Hastings C.	1 hour.	2½ oz.	1½	
Carborundum ..	1 hour.	1½ oz.	.....	1½ oz.
Hastings C.	2 hours.	4½ oz.	4½	
Carborundum ..	2 hours.	4 oz.		
Hastings C.	2 hours.	4½ oz.	4	
Carborundum ..	2 hours.	5 oz.		
Hastings C.	2 hours.	2½ oz.	2½	
Carborundum ..	2 hours.	2½ oz.		
Hastings C.	1 hour.	2 oz.	1½	
Carborundum ..	1 hour.	½ oz.	.....	

Test 4 between wheels of Ontario and North Carolina corundum, made on cast steel and maintained for three hours, shows that the former ground off one ounce more than the latter, or an excess of 15½ per cent. Test 4A between wheels of Ontario corundum and carborundum, made also on cast steel and maintained for eight hours, shows that the former ground off 19 oz. and the latter 5½ oz., being an excess of 13¾ oz. or 262 per cent. in favor of Ontario corundum. In steel plow works abrasive wheels are largely used, and it is probably the case now that as much of steel as of iron undergoes abrasive treatment in foundries and machine shops.

Testimony from Other Sources.

Smaller samples of grain corundum than that furnished the Hart Emery Co. have been supplied different companies both in the United States and Europe. In no case has the material been condemned. The following quotation from a letter recently received by the Director of the Bureau of Mines from a London, England, firm to whom some pounds of the grain had been sent voices the opinion of others who have examined the material : "We consider the mineral to be good, and hope some company will be formed for the exploitation of these corundum deposits ; in which case we shall be glad to hear from you again."¹⁹

¹⁹ Since the above was written an additional quantity of corundum-bearing rock has been treated under the direction of Mr. R. Instant in the mill of the Kingston School of Mining. This rock was obtained at the Robillard property in the township of Raglan and weighed 8 tons 650 lb. The method followed in its treatment was the same as that used by Prof. De Kalb and described by him in the Report of the Bureau for 1897. The rock was first broken in a Blake crusher to such a size that the larger fragments had a diameter of about one inch. It was then passed through rolls, after which treatment the larger pieces of rock had a maximum diameter of one-quarter inch. After coming from the rolls the rock matter was sized by means of sieves. It was then treated by the Hartz jig, which through the agency of water separated the minerals of low specific gravity (chiefly felspar and mica) from those of higher specific gravity. These latter were corundum and magnetic iron ore. After coming from the jig the mixture of these two minerals was dried and then the magnetite was freed from the corundum by means of the magnetic separator.

The 8 tons 650 lb. of rock gave by this treatment, after recrushing some of the No. 10 and 12

mesh, the following amounts of the different numbers of cleaned corundum.

No. 10	259 lb.
" 12	467 "
" 16	506 "
" 20	263 "
" 24	221 "
" 30	282 "
" 40	180 "
" 50	155 "
" 60	60 "
" 70	17 "
" 90	10 "
" 100	9 "
Total	2369 "

This equals 14.22 per cent. of the rock treated. In addition there were various small amounts of corundum abstracted as samples at different times, which would aggregate probably 50 lb. Moreover the dust or finest material coming from the crushers was not jigged. This material it was estimated contained about 100 lb. of corundum in a fine state of division. In addition to this some corundum was lost in the tailings from the jigs.

The result of this test agrees with that obtained by Prof. De Kalb on rock from the township of Carlow, which adjoins Raglan on the west. In that test the amount of corundum extracted in the mill was equal to 14.67 per cent. of the rock treated. The rock from both townships was similar in appearance, being coarse grained and for the most part pink in color, forming what is known as syenite-pegmatite.

The specific gravities of the various numbers of the grain corundum extracted in the mill test from the Raglan rock were determined. Those of No. 10, 30, 40 and 50 were found to be 3.952, 3.953, 3.976 and 3.945 respectively. Since the specific gravity of pure corundum ranges from 3.95 to 4.10 it will be seen that the product from the mill run of the Raglan rock is practically free from foreign matter.

The X-ray photographs which accompany this report show the form and actual size of the grain of corundum of the different numbers. They moreover show that it is possible by photographing samples of commercial corundum in this way to determine their degree of purity, since corundum grains themselves are not so impervious to the

rays as are silicates such as felspar, garnet, chlorite and mica, which are frequently associated with this mineral or are used to adulterate it in commerce.

A dozen or more samples of the grain corundum, each weighing upwards of 100 pounds, produced from the Raglan rocks, were submitted to leading manufacturers of abrasive goods in America and Europe, by whom they were tested and pronounced suitable for use both in vitrified wheels and in those which are cemented together according to the ordinary binding formulas. The Prescott Emery Wheel Co., of Prescott, Ont., report: "For light work for tools the corundum presents a fine cutting surface. If these wheels are too soft or too hard we can easily remedy that by a variance in our formula." The Sterling Emery Wheel Mfg. Co. of Tiffin, Ohio, say: "The samples look very nice and the corundum works well. Please advise us in what quantities you expect to get it out." The Chicago Wheel and Mfg. Co. say that the corundum in the wheels manufactured by them looks well and they are sure the wheels will do good work. The Norton Emery Wheel Co. of Worcester, Mass., state that the result of their tests on the grain corundum to see whether it would work up satisfactorily according to their process was all that could be desired. The manager of the Northampton Emery Wheel Co. of Leeds, Mass., says his company finds it to be a very good quality of corundum so far as their wheel is concerned. The president of the American Emery Wheel Works, Providence, R. I., writes: "We have found this material well suited for certain kinds of grinding, especially for saw sharpening, roll grinding, spindle grinding, and surface grinding on hardened steel. For these purposes and perhaps for some others we believe it will come into extensive use, provided it can be furnished at a reasonable price and that the quality runs uniform. Our experiments indicate that on the above classes of grinding it heats the work less than emery."

A number of wheels, together with bricks, rounds and triangles, made from Ontario corundum by different manufacturers according to different processes, have been shipped to Paris, where they are to be exhibited in 1900, along with numerous samples of corundum in the raw and partially manufactured state.

CORUNDUM IN ONTARIO¹

By Archibald Blue

JUST one hundred years ago, in a paper read before the Royal Society of London and published in its Transactions, Rt. Hon Charles Greville established and named the mineral species Corundum, the crystalline oxide of aluminium; and we have it on the authority of Professor Judd that in an appendix to Greville's paper the Count de Bournon correctly defined the crystallographic characters of the species. The names of its gem-varieties, sapphire and ruby, had been in use from a much earlier time²; and the name corindum, or corrivendum, had been given to it by Woodward, in a vaguer way, as early as 1714.

Where Corundum is Found.

In the western part of Asia Minor, and in some islands of the Grecian archipelago, the crystalline limestone which is interbedded with the schists and gneisses carries a blue corundum mixed with magnetite, which is the emery of commerce. The corundum occurs in smaller quantities as a constituent of granite and gneiss in Silesia, Auvergne and elsewhere in Europe; in a compact felspar rock in Piedmont; in dolomite with tourmaline at St. Gothard; in crystalline limestone, along with numerous other minerals, in Orange and Westchester counties, New York, and Sussex county, New Jersey, and at various localities in Connecticut, Massachusetts and Pennsylvania. It is said by Dana to be common at many points along a belt extending from Virginia across western North Carolina and Georgia to Dudleyville, Alabama.

¹ A paper read before the Canadian Institute 10 December, 1898.

² In the Burma corundum every shade of color, from white to the highly prized deep crimson or pigeon's blood, is found, and they are named according to colors instead of composition or system of crystallization—the red variety as oriental ruby, the blue as oriental sapphire, the yellow as oriental topaz, the purple as oriental amethyst, and the green as oriental emerald.

In Burma, which became a British Province in 1886, ruby mines have been worked for a very long period. There the

Oriental
Ruby in
Burma.

country rock is chiefly gneiss, with bands of crystalline limestone of varying thickness and many miles in length. Most of the mining has been carried on in the hill-wash and alluvium carried down from the decomposed summits of hills and mountain ranges; and it has been observed that where the sands and gravels are mixed with a dark brownish earthy clay, which is a product of the decomposed crystalline limestone, they are richer in such gems as ruby and spinel. The explorations of Barrington Brown appear, indeed, to have satisfactorily established that in Burma the only rock in which rubies are found in place is crystalline limestone. "It is of the usual composition and character of ordinary crystalline limestones," says Mr. Brown, "being made up of finely crystalline or granular limestone in layers, together with irregularly shaped bands of very coarsely crystalline limestone of white and bluish colors, which are interfoliated with the gneissic rocks." Where a quarry has been worked near Mogok, the matrix of the ruby is a coarsely crystalline, semi-opaque limestone of about twenty feet in width. The rubies are found over a space of six feet in width, extending almost vertically from the bottom of the quarry to the surface of the ground, and along the centre-line, where the rubies are most numerous, are small developments of a grayish diasporite enclosing small crystals of iron pyrites. As to the limestone itself, whether occurring as disseminated crystals through the gneiss or as great interfoliated masses, it is the opinion of Professor Judd that it has been neither organic nor due to direct chemical precipitation in its origin, but has resulted from a metamorphism of the lime-bearing felspars; while during the process of change from basic felspar to scapolite,

and from scapolite to hydrated aluminium silicates, and from these to aluminium oxide, "the slowly liberated oxide may assume the crystalline form, and thus give rise to corundum." Among other minerals found in the corundiferous limestone are pyrrhotite, hematite, apatite, graphite and spinel.

In Ceylon, in the peninsula of India, and in China there are numerous occurrences of corundum in crystalline schists; and in almost every case the mineral is of the gem variety. As far as known to the writer, there are no deposits in Asia now exploited for use in the arts, saving the emery of Asia Minor.

In the United States corundum is confined almost wholly to the region of the Appalachian mountains, along a belt that extends from New Jersey to

Corundum
in Ceylon,
India and
China.

Alabama. In the form of emery it is found at Chester, Massachusetts, in a chlorite belt about twenty feet wide, that lies between formations of hornblende-schist and talc, and traverses the mountains for about four miles. There is also a productive emery mine in Westchester county, New York, which ships from 500 to 700 tons of abrasive emery per annum.

Along the Appalachian mountain chain corundum is found in felspar veins and associated with chlorite in peridotite and serpentine rocks, in amphibolite, dunite and gneiss, as well as in gravel-beds. The principal deposits are found in association with magnesian rocks, chiefly peridotites, which occur as small lenticular masses in gneiss. As a rule however the corundum is neither in the peridotite nor in the gneiss, but in a narrow zone of chloritic minerals between the two. The largest known areas are in the southwestern counties of North Carolina, where corundum was first discovered in 1870. This state has furnished nearly all the corundum of commerce for the United States, but the statistics of the mines and works have never been published. There has been much waste of effort in mining for the gem varieties, encouraged by occasional discoveries, but chiefly by the attractive colors in which the corundum is found. The whole process of

mining and milling has had to be learned by experience; and the task has been made difficult not only by the character of the formations, which is not favorable to sinking or drifting, but also by the closeness with which the corundum crystals adhere to the matrix.³ For abrasive use it is very important that the corundum should be free from particles of rock or mineral softer than itself; and for use as an ore of aluminium it should be free from all impurities, to make extraction practicable by present methods.

Discoveries in Ontario.

The first discovery of corundum in Ontario was made by the late Sterry Hunt fifty-one years ago, in the second year of his

By Dr. Sterry Hunt connection with the Geological Survey of Canada. Dr. Hunt explored

part of the county of Lanark in 1847. He was joined in some of his excursions by Dr. Wilson of Perth, who at that time enjoyed local reputation as a geologist (the mineral wilsonite is named after him), and who is still remembered as a man who paid considerable attention to the natural history of his district. The first place visited by them was the fourth lot on the eighth range of the township of Burgess, upon which Dr. Wilson a short time before had discovered a body of apatite. Near by, on the second lot of the ninth range, was a deposit of copper pyrites in crystalline limestone, and this was also visited. The only exploration work consisted of two or three blasts, and among the masses of rock thrown out were some composed of silvery mica, with quartz, felspar or albite, and calcspar, holding a delicate emerald-green and almost transparent pyroxene of rare beauty, as well as crystals of a dark honey-yellow sphene. The mica was often aggregated in masses of small crystals, having

³ Mr. Alexander Rickard of New York, who is owner of a corundum property at Energy, in York county, South Carolina, says in a letter to me of recent date: "All our corundums are very difficult to clean. While the gangue is soft, it is tough, and adheres to the grains of corundum when it is broken up. This reduces the cutting value, and also creates trouble by fluxing when making into wheels."

a columnar arrangement,⁴ imbedded in which, and disseminated throughout the rock, were a great number of crystalline grains of a transparent mineral, varying in color from a light rose-red to a deep sapphire blue. Dr. Hunt, in his report to Sir William Logan, said :

" Their hardness, which is so great as to enable them to scratch readily the face of a crystal of topaz, showed them to be nothing else than the very rare mineral corundum, which from its colors is referable to the varieties known as oriental ruby and sapphire. The grains obtained were small, none indeed larger than a pepper-corn ; but at the time I was on the spot they were not noticed, and the specimens were collected for the pyroxene, in only two or three of which I have since detected the corundum. It is probable that further examinations may develop larger and more available specimens of these rare and costly gems. It is in this crystalline limestone that they generally occur, and the corundum found in the State of New Jersey is in the same rock and with similar mica."⁵

Yet it does not appear that this discovery in Burgess received further attention from Hunt or other members of the Geological Survey, and the mineral was practically re-discovered there a year ago by Professor Miller of the Kingston School of Mining. It will be seen from Hunt's account that the specimens were collected only for their pyroxene, and that the crystals of corundum were not noticed or identified until a later time.

⁴ It is not improbable that these were decomposed or altered crystals of corundum. On the metamorphosis of the mineral Professor Judd says : " At the earth's surface, as is well-known, corundum or the crystallized oxide of aluminium is one of the most unalterable substances. Fragments found in river gravels and sands, though perfectly water-worn, show no trace of chemical alteration in their surfaces. On the other hand, there can be no doubt that conditions must exist in the earth's crust under which chemical change of this mineral does take place ; this is abundantly proved by the frequency with which undoubted pseudomorphs of corundum occur. Among the minerals found replacing corundum as pseudomorphs are muscovite (damourite), various forms of spinel, andalusite, fibrolite, cyanite, margarite, chloritoid, zoisite, ripidolite and other chlorites, various vermiculites, kaolin, and other substances."

⁵ Geol. Sur. Can. 1847-8, p. 134.

The largest known deposit of corundum in the Province was discovered twenty-two years ago on the farm of Henry Robillard, in the township of Raglan, Renfrew county ; but in this case twenty years elapsed before the mineral was correctly identified. According to Robillard's story, he was returning with his little daughter from a cranberry marsh on the wide flats of York river, and, in climbing a hill which rises about 500 feet above the river, he sat down upon a large boulder to rest. In telling me the story Robillard said : " Annie was kneeling behind me, and picked up a queer-shaped stone, and, showing it to me, said it looked like the stopper of a cruet-bottle. It was just like that ; and I wondered what fool of a man had gone to work and whittled it out. Then I looked at the stone where I was sitting ; and, bless you, sir, it was paved with cruet-stoppers. And here is the very boulder now," he added, as we reached the spot, about half-way down the hill.

Specimens gathered by Mr. Robillard were shown to several persons in Combermere, and one who professed to be a miner of phosphate of lime in Lanark county pronounced them to be crystals of that mineral. In 1884 one John Fitzgerald joined with Robillard in an application to the Crown for the mineral rights on the property, including several lots on the 18th and 19th concessions of Raglan ; and for a number of years they sought in vain for a customer to buy an apatite mine. The sturdy pioneers would brook no contradiction of their claim that the mineral was veritable apatite ; and when a doubt was raised by two young mineralogists who visited the region about ten years ago in the interest of a capitalist, and a suggestion was meekly made that it might be emery, one of the pioneers cut negotiations short by threatening to " punch their heads." Last year, however, these pioneers were overjoyed to learn on the authority of an expert that the mineral was not apatite, but corundum.

Twelve years ago, in 1886, Nesbitt T. Armstrong, a farmer and mill-owner in Carleton Place, discovered corundum on lot 14, in the 14th concession of that township, but he did

not know its name, and did not suspect that it possessed any value. A sample was shown to a student of Toronto University, who thought it might be emery, and inquiry stopped there. But in 1893 Mr. W. F. Ferrier, lithologist to the Geological Survey, acquired by purchase a number of specimens collected by Mr. John Stewart, formerly of Ottawa, among which was a package labelled "Pyroxene crystals, south part of Carlow." On examining these specimens some time afterwards, presumably in 1896, Mr. Ferrier recognized them as corundum, and immediately took steps to ascertain the precise locality from which they came. In October, 1896, he was sent upon this mission by Dr. Dawson, the head of the Geological Survey, and, guided by Mr. Armstrong, he found the corundum in place upon the lot on which Armstrong's discovery had been made ten years before. Then for the first time the fact was established, on the best authority, that this mineral had been found to exist in Canada in commercial quantity, and that it was valuable as an abrasive material on account of its great hardness. But as it was too late in the season for field-work, Mr. Ferrier did not extend his explorations beyond that one locality.

Eleven years ago Professor Coleman, now of the School of Practical Science at Toronto, picked up some boulders of nepheline-syenite

in the vicinity of Cobourg, on the shore of lake Ontario, which held crystals of corundum. A fortnight ago I showed Dr. Coleman several specimens of nepheline, rich in corundum, which I had taken from a large deposit recently discovered in the township of Dungannon, and he at once pronounced them to be identical with his own. "I feel sure now," he said, "that I know where my float-boulders came from."

Geological Reconnaissances.

The first geological reconnaissance of the district in which corundum has been found was made by the late Alexander Murray, of the Geological Survey, in 1853: but his notes of it are very meagre. Mr. Murray made two traverses of the country lying between Geor-

gian bay and Ottawa river—the first from west to east, by way of the Muskoka and Petewawa rivers, and the second by way of the Bonnechere and Madawaska, to the headwaters of the Trent. The source of the Bonnechere is within a mile of Kaministiquia lake, on the Madawaska, near to where Barry's Bay station now stands, on the Ottawa and Parry Sound Railway. Mr. Murray descended the Madawaska to the mouth of its principal tributary, the York branch, or York river; known also at that time by its significant Indian name of Shawashkong, or Mishawashkong, the river of the marshes. The course of the stream, which Mr. Murray ascended, lies for more than forty miles within the corundum belt; and along its banks are numerous exposures of syenite, with occurrences of nepheline syenite. But no reference is made in the report to the rock formations⁶; and the record of levels for the first ten miles is of very doubtful accuracy.

Forty years elapsed before another attempt was made to work out the geology of this

interesting area, and the task was then entrusted to the very capable hands of Dr. Frank D. Adams.

The area under examination is comprised in sheet 118 of the Ontario series of geological maps, and the four corners of it lie in the townships of Digby, Finlayson, Hagarty and Grimsthorpe respectively, embracing an area of about 3,500 square miles. In his first report, made for the season of 1893, Dr. Adams sketched briefly the geological features of the district, the northern portion of which he found to be occupied exclusively with the ancient crystalline rocks of the Laurentian system, and the southern and eastern portions with the limestones and gneisses of the Grenville series. "The discovery of so large an area of the Grenville series in this district," Dr. Adams says in his report, "is most encouraging, as indicating the probable occurrence in it of large and valuable mineral deposits." An extensive and remarkable mass of nepheline syenite was discovered in

⁶ The rock formations along the York river however are carefully noted on the maps which accompanied the report, as are also the waterfalls and rapids of the river from its mouth to its source.

the townships of Faraday and Dungannon, which was traced for a distance of over seven miles in an east and west direction. Dr. Adams says :

"This is a rare rock, found in but few places in the world, and never before discovered in our Laurentian system. The nepheline is very abundant, forming in many places an almost pure nepheline rock. The mass is flanked on the south, along a considerable part of its course, by crystalline limestone, and it is also intimately associated with a fine-grained reddish rock, resembling aplite. It is of a prevailing gray color, and often has a distinct foliation, coinciding with that of the associated rocks."

The beautiful blue mineral sodalite was also found in a number of places, associated with the nepheline syenite, in the form of veins and irregular masses ; but no occurrence of corundum was observed

During the past three seasons Mr. Barlow has been associated with Dr. Adams on the work of this field, and a very interesting and valuable report may be confidently looked for upon some of the most intricate questions of Archæan geology. Dr. R. W. Ells has also been engaged at intervals in surveying portions of the Ottawa valley east of the area on which Messrs. Adams and Barlow have been working, into which the corundum belt is known to extend as far at least as the Ottawa and Opeongo road. The two map-sheets however, as well as the accompanying reports, will deal with the general geology of the districts, and notwithstanding the importance of the corundum discovery it is not likely that prominence will be given to that subject, if the usual practice of the Survey is followed.

Recent Exploration Work.

During the last two seasons Professor W. G. Miller of the Kingston School of Mining has been employed by the Ontario Government to make a special report on the field. Beginning last year with the study of the occurrence of the mineral at the place of first discovery in Carlow, he has been able to trace the corundum-bearing rocks eastward across that town-

ship, through Raglan and Lyndoch, to the shores of Clear lake, near the eastern line of Sebastopol, a length of about 30 miles. The breadth of the band varies from half a mile to three or four miles, and its total area embraces about 60,000 acres. The prevailing country-rock of the district is gneiss, composed chiefly of hornblende, biotite and felspar, and it is probably an altered gabbro. Numerous dikes or masses, consisting largely of felspar, cut through the older rocks, which sometimes have the character of coarse syenite, passing in places into nepheline syenite. In both of these rocks corundum was found, as well as magnetite, pyrite, garnets, zircon and sodalite. In continuing his work this year Professor Miller has succeeded in tracing the syenite band continuously for about 75 miles, from the township of Glamorgan in Haliburton to the township of South Algona in Renfrew, besides tracing it to a considerably greater width over the region explored last year.

Corundum was found at a number of places in the western part of the belt, and a large and apparently rich deposit in a ridge of nepheline syenite near the middle of it in the township of Monteagle. But as the rocks over nearly the whole of their extent are covered with sand, it is probable that many valuable deposits remain to be discovered. The total area of this band is about 300 square miles ; and, as it lies in a Free Grant district, the mineral rights are reserved by the Crown in almost all the lots that have been taken up for settlement. In a few cases, where lands were sold more than thirty years ago, the mineral rights went with the surface rights, and since that time some lands have no doubt been sold or leased as mining lands. But it is safe to say that the Crown holds for disposal the minerals in at least 90 per cent. of the whole tract.

Two years ago corundum was found in a property that was being worked as a mica mine in the township of Methuen, in Peterborough county, about 45 miles southwest from the original discovery in Carlow. This locality has also been explored by Professor Miller this year, and the corundiferous band

By Barlow
and Ells.

An extensive
Area -
traced out.

Prof. W. G.
Miller's Re-
ports.

of syenite has been traced in a northeast and southwest direction about six miles, with a width of two miles. The range of hills over which it extends is known locally as the Blue mountains, and at its southwest end it reaches the shore of Stony lake.

A Tour of the Corundum Belt.

I spent the last week of September with Professor Miller in going over the more northerly band, from the easterly end of it on Clear lake, in Sebastopol, to the village of Bancroft on the Hastings road, on the line between Dunganon and Faraday. Only a few of the principal properties were visited, including the Block location in Brudenell, the Robillard location in Raglan, the Armstrong location in Carlow, and a recent discovery in Monteagle, not far from the York river. All these are large deposits, easy of access, and favorably situated for mining operations.

Where the exposure occurs on the Block farm the crystals are in syenite, and are thickly studded in the face of the rock. Outcroppings of nepheline syenite occur on the Block Farm near by; and, owing to its resemblance to limestone, an attempt was made by the owner to burn it for lime. The crystals of corundum have a bronze lustre, and vary in size from half an inch to an inch in diameter. Numerous boulders are strewn over the face of the ground which carry a high percentage of the mineral, and in some cases the crystals are nearly pure white in color.

On the Robillard hill corundum may be traced for a mile or more along its southern face, wherever the syenite is exposed. The corundum crystals are frequently observed to run in strings several inches wide along the surface of the rock, and are of all sizes from half an inch to two or three inches in diameter, usually barrel-shaped, and ranging from an inch to four or five inches in length. On the western shoulder of the hill there is an outcrop of nepheline syenite; and in this rock the crystals are finely shaped, but of small size—about a third of an inch in diameter and an inch or an inch and a half in length.

An expert who has examined this hill estimates the corundum in sight at several millions of tons. There is certainly a large quantity, and in some places it amounts to from 30 to 40 per cent. of the rock mass. Along the foot of the hill are numerous large boulders of syenite, speckled over with crystals like plums in a pudding.

The Robillard hill is cut off by a stream upon its west side from a range of high hills that extends westward five miles into Carlow. Professor Miller has carefully examined this range, and has discovered corundum in it at a number of points. The largest on the Armstrong Lot, showing however is on the Armstrong lot, where another stream cuts through on its way to join York river. The rock has scaled off so as to show a perpendicular face about 300 feet in length and 30 feet in height, exposing a mass of syenite which has been thrust up through the gneiss, and which in its turn has been cut by a dike of pegmatite. The gneiss has been thrown up to form an anticlinal arch over the syenite, but is cut through along the north side, where the syenite dike is well exposed with a thickness of ten or twelve feet. According to Mr. Ferrier it has been traced along the strike about 700 feet. Crystals of corundum are numerous on the exposed face of the syenite, and are also found in the pegmatite nearest the syenite, which is composed chiefly of feldspar. But where quartz comes in with the feldspar the corundum disappears. A lot of several tons, taken without selection from this location last year and treated at the Kingston School of Mining, yielded from 12.75 to 15.5 per cent. of corundum.

The last location I examined is in the township of Monteagle. It is in a ridge of nepheline syenite, having a width of 90 to 100 feet, and rising upon one side to a height of about 60 feet.

My time only permitted me to follow it for a length of about 150 yards, but Professor Miller informed me that he had traced it for half a mile. The whole surface, as far as I examined it, was thickly strewn with small crystals of corundum, ranging in color from pearl to blue; but here and there parts of it were altered into white mica. A sample of

it, assayed for me under the direction of Dr. Coleman, carried nearly 10 per cent. of corundum, and was remarkably free from iron. An ore of this character ought to be well suited for the production of aluminium, especially as the nepheline itself, the gangue rock contains about 30 per cent. of alumina.

Economic Uses of Corundum.

Here it may be remarked that, owing to the presence of iron and other impurities, makers of aluminium assert that corundum is unsuited for the production of that metal. But it is safer to keep an open mind on subjects of this nature. When one reflects that by the adoption of new and improved processes the cost of producing aluminium has been reduced within forty years from its weight in gold to 30 cents per pound or less, one ought not to assume that it is impossible to find a process for producing pure corundum at low cost, if not a process to make aluminium out of an impure ore. Professor DeKalb of the Kingston School of Mining was able last winter, with a small experimental plant, to extract corundum (99.61 per cent. pure) from rock that carried five per cent. of magnetic iron ore. What then might be expected from a large and well-equipped plant, capable of treating 50 to 100 tons per day, supplied with every device that the wit of man can invent, and especially with a good quality of rock to work upon? In one particular the Ontario mineral appears to differ from the mineral of the Appalachian belt; the gangue is brittle, and is easily broken up and separated from the corundum.

It will certainly add greatly to the value of the corundum deposits of Ontario if they can be used in producing aluminium as well as the material for abrasives, if the history of that metal during the last ten years is a fair index of its future. In the ten years ending with 1897 its production in the United States has risen from 19,000 pounds, valued at \$3.42 per pound, to 4,000,000 pounds, valued at 37½ cents per pound; and so much progress in so short a time seems to be ample justification for the statement of Professor Richards made three years ago in the preface to his

valuable book on Aluminium: "The abundance of aluminium in nature, the purity of its ores, its wonderful lightness and adaptability to numerous purposes, indicate that the goal of the aluminium industry will be reached only when this metal ranks next to iron in its usefulness to mankind."⁷

None of the discoveries hitherto made in Ontario seem to encourage the hope that gem varieties of the corundum are to be found, although in some localities an occasional crystal is to be seen with qualities not unlike sapphire, being semi-translucent and of bluish color. Perhaps if search were made in the crystalline limestones it might be awarded with better success; not that corundum of any quality has yet been found in the limestones, but because their relations to the gneiss are not dissimilar to those which obtain in Burma. When the source of the limestones has been worked out, it may be shown that, like those of Burma, they have been derived by metamorphosis from the felspar of the gneiss, or

⁷ Aluminium: Its history, occurrence, properties, metallurgy and applications, including its alloys. By Joseph W. Richards, A.C., Ph.D., Instructor in Metallurgy at the Lehigh University. Third edition. At page 474 Prof. Richards says:

"It does not withstand chemical agents in general as strongly as the noble metals, but it withstands air, water, sulphuric acid, nitric acid and sulphuretted hydrogen—which is not the case with iron, copper or even silver. We have then a semi-noble metal; but while silver, gold and platinum have extremely small prospect of becoming noticeably cheaper, yet the time is probably not far distant when we shall have our semi-noble metal at the price of the base ones. This affords the immense future for aluminium. Whatever its price, it can only replace gold or platinum because of its lightness; it already replaces silver especially because of its resistance to sulphur, as well as for its lightness, besides being cheaper; it can only replace the common metals at its present price for uses where its lightness is an extraordinary advantage. But when its price is down to that of these baser metals, it will begin to replace them by virtue of its other superior qualities, chemical and physical; aside from its lightness it will win a large field simply in comparison with them on its merits as a metal. Thus there are wide applications now almost unthought of, because the high price has been a blank wall to stop its use; but as it cheapens more and more, we hear every day of new uses brought to light. Thus its sphere will widen until, since its ores are as cheap as those of iron, it will approximate in utility to that universal metal. At the time of this writing (1895) there are only four metals which are cheaper bulk for bulk than aluminium, viz.: iron, zinc, lead and copper; and the amount of aluminium produced yearly is increasing much more rapidly than any of these. Aluminium has therefore already won its place among the common metals of everyday life. It will, of course, be many years before it outstrips any of these, but I believe the ultimate goal of aluminium industry will be reached only when it stands next in importance and value of annual production to iron. From this time forth every year will see substantial advance towards this goal, and the next century may see this end attained."

perhaps from the felspar of the syenite ; and if so, the analogy would suggest that these rocks are worth prospecting for corundum in some of its more valuable forms. In a note received from Professor Miller on this subject he says :

"It is quite possible that corundum may yet be found in considerable quantity in crystalline limestone in Ontario, as in India and Burma. In India the mineral occurs under various conditions in metamorphic (limestones, etc.) and igneous rocks. Of course there need be no connection between the occurrence of the mineral in these two classes of rocks. If corundum occurs in our crystalline limestones, it is of a different origin from that occurring in the igneous rocks (the syenites)."

The crystals discovered by Sterry Hunt in Burgess, it will be remembered, were found in association with pyroxene in crystalline limestone.⁸

Scheme to Establish a Home Industry.

In view of the extent and apparent richness of the corundum fields in the Province,

the Government has taken steps aimed at developing the deposits and establishing a home industry.

Regulations have been drawn up under which the mineral rights in lands lying within the two corundiferous belts have been withdrawn from sale, and hereafter the mineral and mining rights in such lands can be acquired only under the leasehold system. Instead of allowing speculators to take up and hold lands with a view to sell out their interests to miners and capitalists at a large profit, it is proposed that the advantage of acquiring lands upon the lowest terms shall go to the miner and manufacturer direct ; and in the case of parties who will undertake to conduct mining and treating operations on the largest and completest scale, and who can furnish satisfactory assurance that they possess the requisite capital for the proposed operations (including separation of the ore

from its gangue, milling for abrasive uses, manufacture of abrasive goods, and the production of aluminium), the Government may concede a preference in the selection of mineral lands. It is also provided that the Government shall have power to require that all corundum mined from lands leased under the Regulations shall undergo certain processes of treatment and milling at works to be erected in the Province to prepare it for market ; and may further require from time to time, as circumstances appear to warrant, that works be established in the Province for the manufacture of all useful or commercial products for which the mineral or ore is economically adapted. Following is the text of the Regulations, which were adopted by Order in Council July 4, 1898 :

1. All corundum-bearing lands the mining rights of which have been already or may be hereafter withdrawn from sale or lease, or in which the mining rights are or may be otherwise reserved by the Crown, shall, subject to the general provisions of the Mines Act, except as herein provided, be disposed of under the leasing provisions of the said Act, and shall continue to be held as leasehold lands only.

2. During the first period of ten years the lessee shall expend in stripping or in opening mines, in sinking shafts or in other actual mining operations, or in milling or otherwise treating the ore or mineral taken from a lot or location to prepare it for the market, exclusive of all roads houses, mills, machinery and other like improvements, a sum not less than at the rate of one dollar per acre per year ; and where an area of not more than 600 acres, consisting of two or more separate lots or locations, is held by the same person, partnership, syndicate or company within a block of 4,000 acres or two and one-half square miles, the whole value of the mining operations required to be done in one year may be expended on one lot or location at the discretion of the lessee, and so for every additional 600 acres or fractional part thereof that the same person, partnership, syndicate or company may hold within the same block.

3. In the event of failure on the part of the lessee to carry on mining operations as required in the foregoing section in each and every year of the first term of ten years the lease shall forthwith cease and determine, and all interests of the lessee in the land or lands shall revert to the Crown ; nevertheless it shall be competent for the lessee to prove that during one or more preceding years of the term the extent of mining operations carried on has been adequate to cover the requirements for the year in default, in which case the lease shall not be cancelled, and the lessee may also defeat forfeiture by an undertaking with satisfactory security to expend the full amount required for working conditions within the next succeeding year, including the expenditure in default.

4. At the expiration of the first term of a lease it may be renewed for a further term of ten years at the same

⁸ Since this paper was written specimens of crystals very closely approaching sapphire gems have been found in Hastings, occurring in a narrow outcrop of syenite lying between two bands of crystalline limestone. Some are in nests, and others in isolated crystals.

rental and under the same working requirements if the covenants and conditions have been performed and fulfilled, and thereafter it may be renewed for successive terms of twenty years on such conditions and at such rent as the regulations may provide.

5. The person, partnership, syndicate or company to whom the mining rights may be awarded of any lands which have been located or sold under the Fee Grants and Homesteads Act, or sold for agricultural purposes, shall compensate or settle with the owner or locatee of such lands for injury or damage done or to be done to the surface rights thereof before beginning work thereon, and if the parties fail to agree upon the amount or method of compensation, the Director of the Bureau of Mines shall have power to order and prescribe the same.

6. The Lieutenant-Governor in Council shall have power to fix and determine the maximum price at which corundum taken from lands leased under these terms and conditions may be sold for use in the Dominion of Canada, whether the ore or mineral be in the natural state as raised from the mines or in any stage of treatment or manufacture.

7. The Lieutenant-Governor in Council shall also have power to require that all corundum mined from lands leased under these terms and conditions shall undergo certain processes of treatment and milling at works to be erected in the Province to prepare it for market; and may further require from time to time, as circumstances appear to warrant, that works be established in the Province for the manufacture of all useful or commercial products for which the mineral or ore is economically adapted.

8. The Commissioner of Crown Lands may receive tenders for mining lands and mining rights in the explored belt to the 15th day of September, 1898, which tenders shall be in the form of a cash bonus to be paid to the Treasury for each lot, part lot or location applied for in addition to the first year's rental; but in considering the bonus so tendered for a lot or location, preference in the selection of mineral lands may be given to parties who will undertake to conduct mining and treating operations on the largest and completest scale, and who can furnish satisfactory assurance that they possess the requisite capital for the proposed operations—including separation of the ore from its gangue, milling for abrasive uses, manufacture of abrasive goods, and the production of aluminium.

Postscript.

Only one substantial tender was received under the terms of the foregoing regulations, but an agreement upon all details was not reached until 15th September, 1899, when a contract was entered into with the Commissioner of Crown Lands by Joseph N. Shenstone and B. A. C. Craig of Toronto. This agreement provides for the acquisition by the lessees, subject to the provisions and regulations of the Mines Act and the Water Powers Act, of the lands for which application had been made (not to exceed in the

aggregate 2,000 acres and two water powers on the York Branch of Madawaska river in the township of Dungannon. It also provides that they shall form a joint stock company for the better carrying out of the terms of the agreement, with a minimum capital of \$250,000. Such a company has now been organized and chartered, with the title of The Canadian Corundum Company. The agreement further provides for an expenditure of \$100,000 before 1st July, 1902, for the following purposes, viz:

1. Acquiring from the Crown the mining leases of corundum properties.

2. Stripping and development of corundum properties and the production of grain corundum or other materials therefrom.

3. Development of electrical or other energy necessary to furnish motive power for machinery and works.

4. Erecting within Ontario a plant with capacity sufficient to treat not less than one hundred tons of corundum-bearing rock per day, together with factory, buildings, kilns, etc., and the installation of full machinery for the production of manufactured goods from corundum, and construction of necessary roads and tramways.

For these purposes an expenditure of \$25,000 is required to be made before 1st July, 1900, and \$50,000 before 1st January, 1901, and out of the whole of \$100,000 not less than \$25,000 is required to be expended for the objects enumerated in No. 4. In the event of corundum being found adapted to new uses, the lessees agree to expend such further sums as may be necessary for the full development of such uses. They also agree to expend \$1,000 per year for three years for the purpose of making a series of experiments, to discover some method or methods for the production of materials of commercial value from corundum-bearing rock other than grain corundum, special attention to be given to the production of the metal aluminium, and on 1st July of each year to furnish the Government with a confidential report of progress. A bond in the sum of \$5,000 has been given as security for performance of the terms of the agreement.

CORUNDIFEROUS NEPHELINE SYENITE

By Dr. A. P. Coleman

A considerable area of nepheline syenite was discovered about six years ago in Dungannon township, Hastings county, by Dr. F. Adams, who described the rock briefly in his Report on the Geology of a portion of

Central Ontario, and more fully in the American Journal of Science.¹

In 1896 corundum was found in the same region by Mr. W. F. Ferrier, and in the following year Professor W. G. Miller was instructed by Mr. Archibald Blue, Director of the Bureau of Mines, to examine and report upon the corundum-bearing rocks. In the course of his work it was found that the corundum occurred not only in ordinary syenites, but also in nepheline syenite.²

In November, 1898, the present writer examined an outcrop of the latter rock for the Bureau of Mines on York Branch of Madawaska river near the northeast corner of Dungannon township, or just within Monteaale, several miles from Dr. Adams' localities, and presenting a number of new and interesting features. The rock forms a ridge running nearly north and south for about 350 yards, with a width of about 20 yards, and having a well defined schistose character, so that at first sight it would be called gneiss. It is light to dark gray in color, the darker layers containing much biotite, the lighter ones more nepheline and plagioclase. On much of the weathered surface numbers of small crystals of corundum stand out, having resisted weathering better than the other constituents. In hand specimens of the unweathered rock however the corundum is scarcely noticed, and the rock has quite the appearance of fresh gray gneiss, the nepheline looking like quartz. Near the southern end of the ridge an irregular dike a few feet wide crosses the gneissoid

rock, reminding one of pegmatite. It is white and consists of immense individuals of nepheline and muscovite, often several inches or even a foot long, with small patches of blue sodalite. No felspar was seen in the dike, unlike samples described by Adams, and no corundum was found in it.

Variations in the Nepheline Syenites.

As usual in nepheline syenites, there is great variation from point to point in the rock, easily seen on weathered surfaces and still more marked in thin sections. Adams finds, as essential ingredients of the outcrops near Bancroft, nepheline, plagioclase, and biotite or hornblende in small amounts; but scapolite and calcite usually occur, as well as various minor accessory minerals. Thin sections from the locality here described show more variety in constitution. All the minerals mentioned occur except hornblende, and the felspars include orthoclase and also a little microcline as well as micropertite. The soda-lime felspars are generally present in much larger amounts than the potash felspars, and seem to have a wide range in composition as determined by optical means. A few have angles of extinction of 4° or 5° from the twin plane and appear to be albite, as in the rock examined by Adams; others having a very small angle are probably oligoclase, while a considerable number range from 17° to 23° , indicating labradorite. Some have broad and sharply cut twin lamellæ, others very narrow and obscure ones. All the felspars are beautifully clear and fresh as a rule, much more so than those of the associated Laurentian gneisses and granites.

The nepheline also is generally very fresh and, as mentioned by Adams, has not the color nor oily luster of eleolite, though it seldom shows crystal forms. Large individuals often contain inclusions, minute crystals of hornblende, of biotite, and long rows of

¹ Geo. Surv. Can. 1892-3, part J, p. 5; Am. Jour. Sci., vol. XLVIII, July, 1894, pp. 10-18.

² Bur. Mines, vol. VII, pp. 210-212.

tiny dots of a transparent doubly refracting mineral. Calcite inclusions sometimes occur completely enclosed in fresh looking nepheline. In one example the somewhat weathered nepheline contains crowds of slender transparent fibers or somewhat bent cords, having a little the look of apatite but with a small angle of extinction, perhaps tremolite. Occasionally decomposition products occur along fissures, having the appearance of kaolin but without any distinct structure.

Scapolite is found in about a third of the sections, sometimes almost to the exclusion of other colorless ingredients, and has the look of a primary mineral. Its anhedral meet the adjoining felspar or nepheline in a sharply defined way, with no hint of weathering in the latter minerals. Muscovite is a very common constituent of these rocks, being found in more than half of the thin sections examined, generally as large primary looking individuals, sometimes associated with biotite, though often without it. Biotite is practically the only dark mineral in the rock, hornblende not having been observed. As in the specimens examined by Adams it is very dark in color and has a very small axial angle. Augite was found as small blue-green anhedral in one section only. Magnetite was not found, and apatite was rare.

The most interesting accessory mineral is corundum, which sometimes occurs in fairly well formed barrel-shaped crystals half an inch in length, but is usually smaller and often forms only minute rounded grains. Its color is gray or, less often, pale bluish. Owing to the hardness of corundum it was found difficult to prepare sections rich in crystals, and only two have been studied. Under the microscope their high refractive index and greater thickness than the rest of the section cause the corundum grains to stand out sharply. They are apt to be arranged in clusters in association with muscovite, often completely enclosed in it.

Although the rock here described has a well marked schistose structure, there is nothing in its microscopic characters to suggest shearing or crushing, no mortar structure nor granulation, and seldom even undulatory extinction to hint at a state of strain.

The rock as a whole is hypidiomorphic granular, and except corundum none of its constituents show much tendency to crystalline form.

The coarse-grained dike with its individuals of nepheline half a foot wide is not easy to study in thin sections. The nepheline proves under the microscope to have been slightly fractured, very narrow fissures being filled with a rather brightly polarizing mineral, perhaps felspar. The few inclusions are much like those of the nepheline in the schistose rock, but in one section rather large portions of muscovite are enclosed. The large crystals of pale lavender muscovite have no unusual characters, except their often perfect idiomorphism as against nepheline and sodalite. The crystals are not hexagonal in cross section, but four sided, having one angle of about 60° . The basal cleavage is somewhat inclined to the prismatic edges, though a series of pyramids having a very long C axis makes it difficult to determine the angle. In thin sections cut across the cleavage this muscovite has an extinction angle of 3° to 5° .

If single thin sections were to be diagnosed alone four quite distinct types of rock could be described from this outcrop: a rock made up chiefly of scapolite and muscovite with a little biotite, plagioclase, and nepheline; a rock containing about equal parts of plagioclase and nepheline with some mica, and a rock consisting of orthoclase, microcline and nepheline with some mica. There are however transitions between these varieties, and it would be unwise to split up what is so evidently a geological unit into rocks of different names when the whole is so well defined in general character, though each hand specimen shows differences from its neighbors.

No analysis has been made of this rock, but one specimen yielded nearly 10 per cent. of corundum in a heavy solution. As there was no magnetite nor other heavy mineral present the separation was very complete, corundum having a much higher specific gravity than the other ingredients. Since every mineral pre-

Distinct
types of the
Rock.

Microscopic
Characters.

Alumina
a prevailing
Constituent.

sent, except the trifling quantity of calcite and apatite, contains alumina, nepheline in particular to the extent of more than 30 per cent., this oxide must occur in very large amounts. On the other hand iron oxides must be very low, since the only iron-bearing constituent is biotite.

Specimens from Other Localities.

A specimen of nepheline syenite was obtained from Lancaster's farm, some miles southwest of the locality just described, from a small outcrop showing no schistose structure. It is coarser grained, but of the same color and general appearance as the rock from York Branch. Thin sections show however that it has been subjected to shearing forces, since there is a granulation round the larger pieces of felspar and nepheline suggesting mortar structure. Nepheline is present in large amounts, and also a peculiar type of micropertthite having long fibrous looking inclusions of one felspar in another, the main mass being in parts very finely striated (anorthoclase?) with twin lines making an angle of about 23° with the most marked cleavage. Oligoclase and biotite occur in smaller amounts, the latter as usual very opaque. Some of its outer scales weather to a bronze-brown color, are dichroic, and have the optical axes much farther apart than in the fresh mica.

Specimens of a medium-grained white rock dotted with darker minerals come from a locality not visited by the writer, in Methuen township, Peterborough county, and are interesting as containing many dark brown corundum crystals having a bright bronze lustre on basal partings, as well as minute crystals of magnetite. Thin sections of one specimen disclose chiefly oligoclase, finely striated and with a low angle of extinction from the twin plane; a little microcline, nepheline and muscovite making up the rest of the rock. Sections of another specimen very similar in appearance contain more muscovite and a large amount of nepheline, or rather of a turbid decomposition product, confusedly scaly or fibrous, having high double refraction. The mineral seems to have parallel extinction, fuses readily without intumescence to a white glass, and gives water in the closed tube, so

that it is no doubt a uniaxial or rhombic zeolite, perhaps natrolite. The corundum is very opaque, so that only minute particles of crushed crystals can be studied satisfactorily. It contains many inclusions of two kinds, slender black needles lying parallel to one another, and brownish red strips and plates somewhat irregularly shaped and placed. The latter are probably hematite, and produce the bronze lustre seen on basal planes of the corundum. Extinction is parallel to the needle-like inclusions, and there is a rather strong dichroism, violet when the needles are parallel to the chief section of the lower nicol and reddish-brown in the opposite position. Some fragments, no doubt parallel to the basal plane, are not dichroic.

The first of the two specimens might be named a plagioclasite (anorthosite contains a more basic felspar) if taken separately, but the second does not differ from typical examples of the York Branch nepheline syenite except in the complete weathering of its nepheline, and probably both are varying forms of the same rock mass.

Through the kindness of the Director of the Bureau of Mines specimens of corundum rocks from Raglan township in Renfrew county, about twenty miles northeast of Dunganon, have been placed at my disposal. One is white, somewhat schistose, and much like the Methuen specimens except that it contains biotite, and that the pale greenish corundum crystals are almost an inch in diameter and have no bronze shimmer on basal planes. Under the microscope it is found to consist mainly of plagioclase (oligoclase) and biotite, the latter pale greenish-brown, faintly dichroic and with a small axial angle. There are also a few large patches of colorless muscovite having a large axial angle. The specimen has the mineralogical composition of a diorite, though of a very unusual character; but Professor Miller states that nepheline syenite occurs close by, apparently part of the same rock mass, though not so highly corundiferous.³

These white rocks were taken for limestone by farmers of the region, and an attempt

³ Bur. Mines Rep. 1897, p. 222.

was made to burn them for lime, of course in vain. Hand specimens, partly fused, were taken from the kiln and supposed to be nepheline-syenite, many of them doubtless having that composition; but the one provided for microscopic examination contains no nepheline. It is evidently part of a boulder, and is schistose and pale gray to white on the surface, but mottled bright blue and white where broken. Under the microscope the rock is found to consist of scapolite, sodalite and biotite, with a very little orthoclase. The scapolite forms the greater part of the rock, the spaces between its anhedral being filled with sodalite; the latter blue throughout when in small portions, but only on the edges when in large ones, the centre being colorless and isotropic. The boulders are said by Miller to be blue only after being burnt in the lime-kiln. The biotite is deep red-brown in color, has a high absorption and a wide axial angle, perhaps the result of heating; just as many dark biotites turn brown by weathering and have a wider angle between the optical axes. There are small quantities of an unknown mineral present, white, transparent and having a low double refraction, so as to give only dull blue or purple tints between crossed nicols. Two or three sections of it show an axial image consisting of a black cross opening out about as far as in many biotites, but without colored rings. It is optically positive.

About eleven years ago the writer collected a considerable number of specimens of nepheline-syenite from drift boulders

in the neighborhood of Cobourg, which lies about south-southwest of the localities referred to above and from fifty to a hundred miles distant from them. At that time nepheline syenite had not yet been reported from the Province.⁴ In a general way these specimens correspond in appearance and composition to those that have been described, though a number of additional minerals occur in them, the more important being hornblende, augite and garnet, both of the ordinary kind and melanite, the brown variety. Only one of the specimens collected then contains corundum;

Drift
boulders at
Cobourg, in
Northum-
berland.

and it, though closely like the others in appearance, shows little or no nepheline and resembles in mineralogical constitution one of the specimens from Methuen. The purplish-gray corundum crystals are quite large, and thin sections show the same needlelike inclusions and dichroism as the Methuen crystals, but not the hematite plates. As there is not much doubt that the Cobourg drift boulders originated in the nepheline syenite region to the northeast, they have been referred to here and may be considered in connection with the rocks previously described.

Uniformity in Variety.

In spite of the great variations in mineralogical composition to be seen in hand specimens, all the rocks referred to have much in common; they are white to gray in color, generally schistose, often corundiferous, and present the same general habit, so that in field work they are naturally thrown together as nepheline syenite and can be sharply distinguished from adjoining Laurentian gneisses, granites and syenites. While not all of them contain corundum in large amounts, they serve as a general guide to the discovery of the corundiferous rocks, and are so used by prospectors for that mineral. Some of the ordinary syenites of the region however contain corundum also, and the largest crystals found occur in them.

Just why the magma which has solidified into the group of rocks described above should be so versatile in regard to mineralogical composition is not easily explained; but no other rock known to the writer shows so great a variety of types within short distances as may be found in the nepheline syenites. It may be that experiments such as those of Morozewicz⁵ will give the clue to this variability, which seems to depend on the large proportion of alumina in the original magma. The corundiferous varieties of nepheline syenite represent magmas supersaturated with alumina but not saturated with silica.

⁴ Trans. Roy. Soc. Can., 1890, pp. 14-18.

⁵ See Review by T. A. Jaggar: Jour. Geol., 1899, vol. VII, No. 3, pp. 300, etc.

MICHIPICOTON IRON RANGE.

By A. P. Coleman and A. B. Willmott

Instructions
to Dr. A. P.
Coleman.

Instructions have been sent to Mr. Boyd to withhold all iron-bearing lands in the Michipicoton Mining Division from registration, pending an examination of the region by a competent expert, and a report on the apparent extent and value of the iron ores. I have to inform you that you have been selected to make such examination and report, and to request you to proceed at once to Michipicoton for that purpose. Prof. Willmott had better go with you, and you will exercise your own judgment as to other help, whether you take with you the men you have engaged for the season or depend upon getting men at Sault Ste. Marie or Michipicoton River. I think you have already examined the hematite deposits of Gros Cap, but it may be advisable to make a more careful examination of them with a view to determine their relation with the rock formations. I remember that there are some small showings of iron ore on the south side of Michipicoton bay, just south of the small creek which enters the lake at the foot of the mountain, but I am not aware that there are any deposits of value in that locality. The largest deposits are said to be north of lake Wawa, and I learn from Mr. Boyd that Mr. Ely, an American iron owner, has recently acquired nine claims which were staked out by one Alois Goetz, for which he has paid \$35,000. Mr. Clergue, of the Sault Ste. Marie Pulp Works, has also acquired a number of claims staked out in the same vicinity, besides two or three of the Johnston locations immediately north of the east end of lake Wawa. Mr. Clergue believes that there are very extensive hematite deposits several miles north of the claims acquired by Ely, yet I do not know whether any discoveries have been made there by him or his explorers. There is a third deposit of ore about twenty miles west of Magpie river, along the Herrick line, the locality of which is probably known to Prof. Willmott. It must be very near the head waters of Dog river, and is probably the same place as is marked "McDougall Mine" on your new map of the Michipicoton Division. I do not know how you can most easily reach this region, but if Herrick's line can be located where it crosses Magpie river the best plan, I should think, would be to follow that line from the river westward. When you have examined the known deposits of ore—and there may be others since discovered of which I have no knowledge, but which may have been reported to Mr. Boyd—you will be guided in the making of such further exploration of the region as you may think necessary. You are requested to make a preliminary report on this exploration work as soon as it is completed, and you are also asked to suggest or recommend such scheme in dealing with the lands as you think is best suited to serve the interests of an iron mining industry in our own Province, including the smelting of the ores.

July 8, 1899.

A. B.

IN accordance with instructions given by Mr. Archibald Blue, Director of the Bureau of Mines, the geologists of the Bureau set out by steamer for Sault Ste. Marie on July 15. On July 18 Little Gros Cap was reached, canoes, supplies, etc., having been brought by the steamer Telegram, and the iron deposit near the harbor was examined.

Red and Brown Hematites.

On the lakeward side of Little Gros Cap red hematite is found interbanded with thin bluish layers of cherty material.

The banding runs about north-west and southeast, so far as can be ascertained, and the dip is 45° to the southwest. The ore is lean so far as it can be seen on the dump formed

by the old workings; but Captain Grierson, who was employed in the mine, states that a body of good ore was found at the bottom of the shaft. Further details are given in last year's report of the Bureau. The property has been acquired by Mr. Ely for Minnesota and Illinois capitalists according to current reports. The rock associated with the ore is partly chert, partly fine-grained sandstone or quartzite, and the deposit suggests in some respects those of the Vermilion range, Minnesota; though no red jasper occurs at Gros Cap, as happens in the Minnesota iron ranges. The exact strike of the ore beds is not easy to determine. The nearest schistose rock has a strike of north 60° east.

The only other deposit in the region on which any work has been done is at Boyer lake, nine or ten miles to the northeast and about a mile and a half from Wawa lake. Here a large deposit of brown hematite or limonite is being opened up by the Clergues. The development consists mainly of stripping on claim 68 at the east end of the small lake, where the ore rises as low cliffs above the water and probably runs some distance below water. The ore is generally dark steel gray, and hard on fresh surfaces, but some parts are brown, or yellow, or red. It is generally very pure in appearance, no pyrite being seen, and few impurities of any kind, though some brecciated fragments of sandstone or chert occur on the north side of the deposit.

Stripping shows an ore body more than 450 feet in length from east to west and 350 from north to south, rising at the highest point 94 feet above the lake. A drill hole 15 feet deep passed through solid ore, and the deposit is probably much thicker than that, but its total thickness can be determined only by the diamond drill or by sinking a shaft. The lowest estimate of the ore in sight would be 250,000 tons, and the actual amount is probably much greater than this.

The ore body stands apart from the adjoining rocks and seems to be of a different origin, probably of much later age. The surroundings are very peculiar. A very steep hill rises 460 feet above Boyer lake just to the east of the ore deposit, and steep rocky walls enclose the lake to the north and south. The lake is 115 or more feet deep and is enclosed in a rock basin. No ore of any account is found on the hill top nor on the adjoining rocky ridges; and at the west end of the lake sandstone heavily charged with pyrite occurs. The ore body does not lean up against the adjacent hills, but is separated from them by small ravines. The next lake to the west (Glen lake on the map, more properly Sayers lake) has very large deposits of pyrites on its shores; and it looks as though the mass of brown hematite originated from decomposition of the great masses of pyrites in the soft sandstone, which decayed away

leaving the lake basins. The hills enclosing Boyer lake like an amphitheater may have served as a kind of funnel to concentrate the solution of iron, which was then deposited in the east end of the narrow valley of lake Boyer.

If this theory is correct the ore deposit on claim 68, and reaching also into claim 69, is an exceptional thing due to the particular conditions found at Boyer lake. The ore is entirely different from that of Gros Cap or that of the Vermilion range in Minnesota, where jasper is the accompanying rock and the ore itself is red hematite. The other claims taken up in the Boyer lake region are of a quite different kind and show no large bodies of ore.

A Possible Iron-bearing Range.

Just north of the Boyer lake deposit dark cherty sandstones with a little iron ore occur, standing nearly vertical and striking about east and west. They look like the rock accompanying the Gros Cap iron ore, and resemble even more strikingly the iron-bearing rocks of the Vermilion range in Minnesota. The flinty iron charged rocks extend for more than a mile along the ridge east of Boyer lake, and are found also toward the west for some distance, though they appear to vanish before reaching Magpie river. Whether they are connected with those of Gros Cap has not been proved.

The adjacent rocks at Boyer lake are chloritic and sericitic schists both to the north and south. Just east of Boyer lake a broad band of hard felsite, bluish and charged with pyrite when fresh, runs parallel to the iron-bearing sandstones, generally forming the crest of the lofty ridge locally known as Waterpower mountain. This felsite weathers dark brown, and is covered by a layer of brown iron ore an inch or a few inches thick. The latter has been held to indicate the presence of bodies of iron ore, and at several points trenches have been made across it. Wherever the trench goes into solid rock however it is seen that the ore forms only a crust, not a body of any dimensions.

About 150 feet below the summit of the ridge Mr. Ely has commenced to tunnel into the cherty sandstone, expecting to open up a large body of soft ore, since he thinks the formation is closely like that of the Vermilion range and the conditions favorable. At the time of our visit the work was just begun and little can be said as to results. The rock penetrated was banded sandstone or chert, with a little ore. A vein of brown hematite a few inches thick was cut by his work and contained good ore, though in small quantities. Mr. Ely considers the outlook promising and has already expended more than \$50,000, if reports are correct, in purchasing options and in development work. His experience in the Minnesota iron region makes his opinions of importance, and it is to be hoped that he will find a large body of good ore.

As no work has been done elsewhere on the range it will not be necessary to describe other parts of it in detail.

Just south of lake Eleanor, and about 2½ miles northeast of the last portion of the iron

Tracing the formation towards the East and Northeast.

range seen east of Boyer lake, rocks of the same kind occur on No. 14 of the old Johnston locations, sandstone and chert in thin layers with a little impure magnetite forming interleaved beds on the face of a steep hill. No ore of importance could be seen, however. From this a chain of small lakes was followed to the northeast, as shown on the accompanying map, and outcrops of the same rock with more ore less ore were found just east of Scott lake and Goetz lake, carrying the range four or five miles farther. East of Goetz lake, near Parks lake, Mr. Alois Goetz has staked ten claims of 40 acres each, covering probably more than a mile of the range. Here large

Showings of Red and Brown Hematite.

masses of soft and hard red hematite lie scattered along the shore and in the soil, and some brown hematite also occurs. A little stripping has been done exposing red hematite in place, so that the deposit may prove of importance, since the rough fragments are scattered over a considerable surface, and some of them at least are of excellent ore.

The next point at which the formation was seen by us is east of a lake expansion of the Magpie river, about six miles north of Goetz lake, where sandstone and black chert with some red jasper occur. Seams of magnetite and red hematite are interbanded with them and thin beds of fairly good ore may be seen, but none of workable size so far as observed. This part of the range forms a series of lofty hills ending in a lake, and was followed by us for about two miles.

As no discovery of the iron range had been reported west or north of Magpie river we did not attempt to follow these rocks farther in this quarter, but returned to Wawa and made our way by a new canoe route to Hawk lake and thence to Missanabie. On lake Manitowick we found two prospectors encamped. Though reticent, they left the impression that iron had been found by them seven miles to the west, not far from Jackfish lake. As their statements were vague and we could secure no guide to the supposed iron deposits, we passed on.

The Iron Range at Dog River.

Our next visit to the range was at McDougall's claims near Dog river, reached by ascending White river to Pokay lake, portaging across the mountain portage, and descending Dog river for about 14 miles to the outlet of Iron lake, three miles to the west of the main river. Here the same set of banded sandstones, cherts and iron ore occurs, with some red jasper. A small quantity of good ore is to be seen, but never in beds of more than an inch or two in thickness. Here also the rocks form a long steep walled ridge, being harder than the adjoining rocks.

East of Dog river rocks of the same sort occur, but with some differences. North of Paint lake large quantities of very impure magnetite are exposed to a width of more than 100 feet. How long the deposit is cannot be determined until much more stripping has been done. The large amount of pyrites in the magnetite and the considerable proportion of rock matter in it will probably render the ore valueless. South of the hill disclosing the magnetite there is a bed of

brown hematite and yellow ochre on the shore of Paint lake, giving that body of water its name. This ore body has not been uncovered by stripping, but certainly extends 200 feet along the shore and has a width of not less than 30 feet. A drill hole has been made three feet deep through ore, but the deposit seems to be thin. The ore body resembles in some respects that now being developed by the Clergues on Boyer lake, though probably of much smaller extent.

Extent of the Range.

The portion of the iron range at McDougall's claims runs about east and west and has been seen by us at points about six miles

Probably continuation apart. Whether it forms a continuous curve with the range starting at Boyer lake is not certain, though probable. If the range is continuous, it runs to the northeast nearly to lake Manitowick, and then bends sharply to the west to Dog river. Including Gros Cap, we have visited eight localities on its course and have walked along about 10 miles of it. Between Magpie river and Paint lake however there is a gap of about 16 miles where it has not yet been found. How far west of Iron lake it extends is unknown. The rough character of the country, its covering of forest and the large amount of swampy land in some parts make its exploration difficult. The band of rock described is often less than 100 yards in width, so that it might easily be missed by one passing in a canoe. This probably accounts for the late discovery of this iron range. At present many prospecting parties are in the woods and the whole course of the range will probably be determined before long. In spite of the withdrawal of the iron district from location by prospectors, many claims are being staked in the hope that those staking them will have first rights when the district is once more thrown open.

Americans from Minnesota are showing a great interest in the region. Mr. Ely, who is stated to represent the Illinois Steel Co., was first on the field, but other parties of Americans are visiting the range. Near McDougall's claims on Dog river we met a party of Minnesota men

under Mr. James. He was disappointed with what he had seen and was going out. One of his men, an experienced iron miner of Minnesota, spoke highly of the region, but thought the valuable ore bodies would only be found by a large expenditure for test pits, as had been the case on the Vermilion range.

The iron deposit on Pic river seems to be of the same character as those of the range

The deposit described, but is too far from them on Pic River. for the assumption that it belongs to the same range. Professor Willmott examined the deposit, and the following account of it is given in his own words: "About ten miles north of Heron Bay station on the C. P. R. an iron prospect discovered by Joe Morrisseau has been taken up by American capitalists. This summer a little surface work has been done in the way of stripping. The west working, on the hill top, shows a very thorough breccia of sandstone and magnetite 15 feet in width. Small narrow lenses of apparently pure ore are seen in the breccia. The wall rock on the west is a slate carrying considerable pyrite, and some of this mineral is scattered through the ore itself. Fifty feet across the strike another hillock is uncovered for a width of 30 feet. Here also there is a mixture of siliceous matter and magnetite with some pyrite. Some distance down the hillside a third stripping shows the continuation of this band as a breccia of sandstone and lean ore. The resemblance to McDougall's property on Paint lake is quite striking, though in this case the yellow ore is lacking. Another stripping 100 yards west of this band shows a siliceous magnetite 10 to 15 feet wide, carrying a little pyrite. At none of the openings is there any body of merchantable ore, but the possibilities of finding larger amounts would seem to be good."

Summary of Observations.

In general one may say that the Michipicoton iron bearing rocks resemble, often quite closely, those of the famous iron ranges of Minnesota and Michigan, the greatest producers of high grade iron ores in the world; and they have been traced more o

less continuously for more than 30 miles. The only large body of ore found on the range up to the present, that of Boyer lake, is of excellent quality and contains at least 250,000 tons, probably very much more. This deposit however seems to be of rather a unique character. It is brown ore instead of red, and seems to have resulted from a special set of conditions which may not be repeated in other parts of the range.

The only other deposits that seem to us to promise well are those of Gros Cap, Goetz lake and Paint lake. The first of these was worked years ago without very good results, but is now in the hands of Mr. Ely, representing Chicago capitalists. The other two are absolutely undeveloped and one cannot say whether they will be of importance if opened up. Whether there are larger bodies of soft ore beneath the cherty and jaspery capping of many hills of the range can only be determined by the diamond drill or by

mining operations. Minnesota men think that such ore bodies will be found, and their experience makes their opinion of weight; but up to the present this has not been proved. It must be kept in mind in any case that the iron ranges of Minnesota and Michigan show many miles on which no iron deposits of value have been found, and the same may be looked for on the Michipicoton range.

At present one can say with certainty only that one ore body of considerable size and of good quality has been found, and that there are indications suggesting that two or three others probably exist. It is likely that at least a few other iron deposits of value will be found in the range now known, but no evidence is yet at hand to show their existence at any particular point.

Whether the Michipicoton iron range will be found to extend farther west is not yet known, and the same may be said as to continuations of the deposit on Pic river.

COPPER IN PARRY SOUND DISTRICT

By Dr. A. P. Coleman

Preliminary Report.

While Dr. Coleman was employed exploring the iron range of Michipicoton in July of the present year (1899), he was notified that upon completion of the work there he would be required to examine and report on the copper-bearing lands of the Parry Sound region, to which attention was being drawn at that time by published accounts of discoveries of large and rich deposits of copper ore. The accompanying preliminary report lacks the high coloring of the practised real estate miner's hand, but it will serve a better purpose in restraining the expectations of land owners and steadying the judgment of moneyed men.

A. B.

AS instructed by Mr. Archibald Blue, Director of the Bureau of Mines, the Parry Sound Mining region was visited and the more important mines and prospects examined during the latter half of August, and the results of the investigation are given in a preliminary way in the following report.

The McGown Mine.

The region first attracted attention to its mineral deposits in 1894, when the McGown mine about two miles east of the limits of Parry Sound was found to contain free gold. In October of that year the present writer was sent to examine the property, and a description of it may be found in the next report of the Bureau of Mines.¹ At that time very little work had been done upon the property, practically only some stripping and the sinking of a pit a few feet deep by the shore of a pond. This disclosed about 100 feet of an irregular bedded vein about three feet wide containing quartz mixed with dark schistose rock and carrying some free gold and copper ores, especially bornite and chalcocite. As the mine was opened for gold, and the amount obtained per ton was small, the owners grew discouraged and little further work was done until a year ago, when the finding of large masses of bornite and chalcocite on the shores of McGown lake a few hundred feet from the original opening once more attracted attention to the mine, this time as a copper

deposit. The property passed from the hands of the McGown Gold Mining Company, consisting of local men, to those of the Parry Sound Copper Mining Company, formed of capitalists from St. Paul and Minneapolis, the transfer having been arranged by Mr. Robert Forbes, who was appointed manager of the new company. Since then the work of development has been carried on with energy, and under the stimulus of purchases of mining lands by the company prospecting for copper has been carried on extensively, proving that ores of the metal occur at many points in the district.

The writer desires to express his appreciation of the great courtesy shown by the officers of the company, Mr. Forbes, general manager, Mr. Koren, superintendent of mines, and especially by Dr. Elftman, superintendent of reduction works, during his examination of the properties owned by the company. Without their aid and permission to travel on their steamer the work could not have been done as satisfactorily.

The McGown mine is on lot 146, con. 4, of the township of Foley, close to the road leading from Parry Sound to Rosseau. The rock enclosing the ore bodies is a coarse grained gray diorite schist, penetrated by dikes of pegmatite, and there are no well defined veins containing the ores, though small stringers of quartz occur frequently. In working the property the old inclined shaft has been

The Parry Sound Copper Mining Company.

First Discovery of Minerals in the Region.

Description of the Property and of the Workings on it

¹Bur. Mines An. Rep. 1894, pp. 98-100.

straightened and continued, so that it is now 100 feet long with a vertical depth of 30 feet at the bottom: and a new vertical shaft has been sunk to a depth of 65 feet on the hill between the two lakes. It is 9 by 11 feet in dimensions, has a two-cage department and is excellently timbered. The third opening is a quarry or pit about 50 by 25 feet on the surface and 21 feet deep, now partly filled with water coming from McGown lake a few feet away. There was a more or less distinct bedded vein at the old shaft, but the later opening beside the lake discloses only a few quartz seams, the rich ore which was produced from it having formed bunches and impregnations in the diorite schist. The ore pile shows much bornite, chalcocite and chalcopyrite with some iron pyrites, but very little in the way of gangue minerals except the country rock itself. Six carloads of this ore, 143 tons in all, were shipped to the Orford Copper Company in June and gave returns of 15.68 per cent. of copper, worth at current rates for the metal \$7,571.13, and leaving a balance above expenses of shipping and smelting of \$5,398.80. Another shipment of about 24 tons of ore made to the same firm in July appears to have contained about the same percentage of copper, with a little less than an ounce of silver and \$5 in gold to the ton.

There are now on the stock pile, as estimated by the company, about 200 tons of selected ore which is expected to run from 25 to 30 per cent. of copper, and 3,000 tons of lower grade ore supposed to contain from 8 to 10 per cent. of copper. All of this ore apparently came from the open pit on the lake shore; and if so the amount seems to have been somewhat over-estimated, since the contents of the pit can hardly have been sufficient for that weight of rock.

The rock coming from the vertical shaft, which is intended to tap the ore bodies far enough below the bottom of the lake to avoid trouble from water, contains some bornite and other copper ores, and from the results of Dr. Elftman's assays is expected to run about 3.1 per cent. of copper; while the rock from the inclined shaft yields from 2 to 6½

per cent. of copper and from .19 to .25 oz. of gold per ton.

The belt of rock carrying more or less copper is from 250 to 400 feet wide, and its length from the old workings to the end of the open pit 800 feet.

Traces of copper have been found also 200 feet farther west than the inclined shaft. What proportion of this great mass of rock will contain enough copper to pay for mining cannot be said until the mine has been further developed. The rich ore is very irregularly disseminated through the rock, not as pockets, but rather as in a fahlband, since there are no large bodies of solid ore, and the boundaries of the ore body are very hard to define. Whether other bonanzas of rich ore like that from the open pit will be found can be determined only by mining.

At the time of my visit the foundations of a ten stamp mill were just completed and most of the machinery for it was on the ground. The amount of gold hitherto found in the ore seems too small however to justify putting up a stamp mill at this stage in the development of the property.

The Wilcox Mine.

Next in importance to the McGown mine is the Wilcox property, owned by the same company, and situated in Cowper township, at the head of a long bay 12 miles from Parry Sound as reached by steamer. On August 25 a shaft intended to be 9 by 11 feet was down 22 feet; a few pits had been sunk at other points along the line of strike, and some stripping had been done. The country rock is gray garnetiferous gneiss, with a dip of about 70° to the north; and the ore body is a fahlband of this rock impregnated with copper and iron pyrites, with small amounts of pyrrhotite, bornite, molybdenite and blende. The fahlband, or copper bearing belt, is 30 to 50 feet wide at the shaft and may be traced for about 1,000 feet. Beyond this, half a mile to the northeast, a pit has been sunk on a rusty belt of rock containing pyrites, and another small shaft has been sunk 1½ miles

A property
in Cowper
Township.

beyond, with several pits between, all showing more or less copper pyrites. It is supposed that the fahlband is more or less continuous for this distance, and that it even reaches the Lafex mine, seven miles from the main shaft of the Wilcox. A large amount of work will have to be done however to demonstrate the continuity of the deposits. In any case there is certainly a large body of copper-bearing rock, and as the ore is simply a band of the gneiss of the country it may be expected to follow the dip to great depths.

The rock is low grade, as might be expected in a deposit of such magnitude; and may have to be carefully selected so as to provide ore rich enough to treat. There are no sharply defined boundaries to the ore body, which seems to fade off into the adjoining rock; and similar but smaller bands of rusty gneiss carrying some copper run parallel to it. Dr. Elftman's assays show an average copper contents of four per cent. in the shaft, with traces of nickel and of gold.

According to Major Leckie, the Orford Copper Company intends putting up a smelting plant somewhere on Georgian bay, perhaps at Parry Sound; and it is stated that they will purchase copper ore reaching four per cent. or over at current rates less cost of transportation, and that this price will leave a good margin of profit after all expenses are paid. On this basis the property should prove a satisfactory one if the average throughout corresponds to the results of assays from the shaft.

Other Properties near Parry Sound.

The only other property which has been much developed is the Lafex, about two miles south of Parry Sound, where a shaft is down 65 feet and drifting is begun. The rock is rusty diorite schist, with a few good seams of chalcopyrite and some pyrrhotite, but iron pyrites is more common than either of the other sulphides. The extent of this copper deposit cannot yet be said to have been proved. The ore body seems much narrower than that of the Wilcox, and differs considerably from the latter

The Lafex property near Parry Sound.

in appearance, so that it is doubtful if it really is an extension of the fahlband described above. The Lafex is owned by the Hattie Bell Company, which has several other properties in the district.

Copper ores have been found at many points on the rocky shores of Foley and adjoining townships, as well as on islands along the coast; and a number of locations were visited.

In most cases very little work had been done upon the deposits, and only trifling amounts of ore, bornite or chalcopyrite, were to be seen, while in some cases the only sulphide observed was iron pyrites. Hardly any of the deposits took the form of veins, almost all being larger or smaller bunches of ore with perhaps a little quartz in gray gneissoid rock. In a few cases the ore was contained in pegmatite dikes, and in others the country rock was coarse hornblende schist or diorite. While a few of these deposits look promising, none of them have been sufficiently developed to make their prospects assured, and it will be unnecessary in a preliminary report to take them up in detail. The point of most importance in this connection is the evidence afforded that the McGown and other more developed properties are not isolated deposits, but that copper ores are to be found widely distributed in the district, though perhaps not often in workable amounts.

Besides the deposits in which copper is the important mineral, there are some containing also nickeliferous pyrrhotite and resembling the Sudbury ores. The best samples seen were from a point on the Indian reserve, Parry Island. These looked promising, but owing to the breakdown of a steamer the locality was not visited; and the lack of transportation prevented also a visit to the mouth of the Shebeshkong or Chepakonge river in the township of Carling, where Dr. Elftman reports extensive deposits of copper ores.

Nickeliferous Pyrrhotite

In the Northern Townships.

A drive was made north to Loring, a number of apparently unimportant prospects

showing copper and iron pyrites being visited on the way. In the township of McConkey near the shores of Caribou lake, ^{preserving} there are a number of locations containing outcrops of a rusty diabase with more or less iron and copper pyrites and pyrrhotite. One deposit on lot 15, con. 4, contains a considerable amount of the mixed sulphides, and furnished a sample which gave an assay a little over one per cent. copper, $1\frac{1}{2}$ per cent. nickel and \$14 worth of platinum per ton. The assay was made on selected, not average, material; and the ore would appear to be more important for its platinum than for the other metals.

The most interesting deposit in the region is on the shore of lake Messagamashen in Hardy township; where a shaft has been sunk 30 feet by the Parry Sound Copper Mining Company. It is now partly filled with water, but the ore dump shows considerable quantities of sulphides, pyrrhotite, chalcopyrite and pyrite, and has a striking likeness to the Sudbury copper nickel ores. There are some thick seams of the ore, but much of the rock on the dump is not highly charged with sulphides. The country rock is coarse diabase, which seems to have penetrated the Laurentian, since pink gneiss shows on the rest of the lake shore.

General Conclusions.

In a general way one may say of the copper deposits in the Parry Sound district that ores are very widespread, that a few properties are likely to develop into valuable copper mines, but that the large majority of the prospects do not look particularly promising. The owners of these prospects seem to have quite exaggerated

ideas of the value of their properties; a not unnatural state of affairs when, if current reports are correct, relatively large prices have been paid for farms on which little ore has been found and hardly any development work done. The largest purchaser has been the Parry Sound Copper Mining Company, which is said to own or to have options on 65,000 acres of land; part of this great area being handed over however to subsidiary companies for development. It is evident that the majority of these farms scattered over the district can never have been carefully explored, and have been taken under option in a speculative way. It is much to be desired that the two main properties should be far enough developed to prove their extent and value. They seem promising now, and it may be hoped will fulfil the expectations formed of them. If this is the case many of the other properties in the district on which traces or small pockets of ore have been found will be worthy of attention.

It is often stated that the rocks of the Parry Sound region are Laurentian, and hence not likely to contain valuable ore deposits. In reality its geology has never been worked out in detail, and it is probable, if not certain, that much of the region corresponds to the Grenville series or Upper Laurentian of Eastern Ontario and Quebec, or to the Keewatin (Huronian?) rocks of western Ontario. As both these rock series are well known to be rich in metals there is no reason to suppose that the so-called Laurentian of Parry Sound is necessarily barren; and the opinion of many inhabitants of the district that geologists have condemned it is not borne out by the facts.

^{Cautions} should be observed in an Underdeveloped Region.

LOWER SEINE GOLD MINES.

By James A. Bow

Owing to some uncertainty as to the Golden Star mine and the fluctuations in the stock of the Company, I think it is very important in the public interest that we should have a report on it from an independent and trustworthy point of view. One or two parties connected with the old Company have been circulating disparaging reports as to the continuation and richness of the ore body, and the effect has been to largely depreciate the shares, almost all of which are now held in Canada. I have therefore to request that you will at once proceed to the locality and make a thorough inspection and report on the mine. Careful measurements should be made to show the size and depth of the vein, the length of the several levels, the amount of stoping done, the number of winzes sunk, etc. The measurements of the width of the vein should be taken at frequent intervals along the drifts, where the ore has been taken out from wall to wall, and a careful study of the vein made to show its relations to the country rock upon both sides of it, and as to the existence of a fault or other indication that the fissure is likely to be continuous in depth as well as in length.

You are required to sample the vein carefully across the whole width of it, perpendicularly and longitudinally, down the shaft as well as along each of the levels. You will number each sample and put a card on it to denote the locality of the mine from which it has been taken, and make a record of each sample to be forwarded here, so that they may be afterwards identified. When you have obtained a full set of the samples, have them boxed carefully under your own supervision, and then forward by express to J. Walter Wells, Provincial Assay Office, Belleville, who will be instructed to make analyses of them and send a report to this office. I will subsequently put Mr. Wells' report in your own hands, so that you may use it in the completion of your report on the mine.

You will carefully report on the mill and machinery generally, with a view to show the character of the equipment and its suitability for doing work economically.

You should also look carefully over the JO41 property, and endeavor to ascertain if the vein of the Golden Star extends into JO41; also whether it extends southerly from the Golden Star, and what its probable length may be. If there are other mineral-bearing veins on the Golden Star notice should be taken of them also.

I have further to request that you will make one of your ordinary inspections of the Olive Gold mine, and of other mining properties in the same locality, and make your report upon these at the same time that you report on the Golden Star.

July 7, 1899.

A. B.

I BEG to report herewith, as directed by you, the result of my examination of the Golden Star and other properties in the Lower Seine River locality.

Varieties of Gold-bearing Formations.

There are four important varieties of gold-bearing formations in the Lower Seine, namely: 1. The well-known porphyry or irruptive granite, containing numerous quartz fissure veins, and represented by such mines as the Foley, Ferguson, Lucky Coon, Golden Crescent, Decca and Manhattan, besides many other localities not developed. 2. A band of felsite schists filled more or less with quartz stringers from a fraction of an inch in width to two or three feet, both parallel with and crossing the strike of the

schists. This formation extends about 20 miles or more from the west of the Olive to beyond the Sturgeon Falls and runs about east and west. It is represented by the Olive, Alice A Emma Abbott, Gold Bug, Independence and numerous other locations undeveloped. I think the Fighting Chance is on the same belt, but this property was not visited by me. 3. There is next a formation of hard green schists adjoining the felsite schist I believe, on both sides. This formation contains bedded quartz veins and quartzitic pyritiferous beds which would probably form both small high grade and large low grade propositions similarly to the felsite schists. The Swede Boy mine is on this formation. A band of conglomerates extends for about 15 or 20 miles east and west, south of the schists above mentioned. 4. The

smallest formation, but equally important to any of the others, is that of the Golden Star, JO41, and two or three of the adjoining properties. It consists of massive porphyry and greenstone, cut by numerous dikes of greenstone, felsite, etc., of different ages. This formation is bounded by conglomerate and protogine on the south, as shown by the accompanying plan, and by green schists and trap on the northeast, north and northwest. A small body of conglomerate is found at one point on the north of JO41. The porphyry and protogine are later than the conglomerates, as proven by the study of the contacts. Inclusions of the conglomerate in which traces of the boulders are almost obliterated are found not more than 100 feet from the main shaft of the Golden Star, both north and south, and conglomerate pebbles are found in the protogine near the contact. Doubtless the porphyry is the latest formation of the three. Both the porphyry of the Golden Star and the greenstone of JO41 are intimately associated. Dikes of greenstone and felsite are found in the porphyry, and dikes of lighter colored siliceous rock are found in the greenstone. The relations of these two formations to each other is difficult to understand. To sum up, the formation changes from that of a siliceous porphyritic and felsitic nature on the southern part of the Golden Star property to a coarser-grained greenstone on the northern part of JO41, and great disturbances must have taken place at the time of their production as evidenced by the dikes and inclusions of other rocks in each.

Golden Star Mine.

The main shaft of the Golden Star is 260 feet from the eastern boundary and 680 feet from the southern boundary of location AL114. The protogine is about 1,000 feet from the shaft, and the conglomerate about 300 feet. As to whether these formations dip towards the shaft, it is difficult to say. Nothing of any vital economic importance can be determined in the matter. Going south from the main shaft the ground rises gradually to a height of perhaps 70 or 80 feet for a distance of about 300 feet, or to the conglomerate contact. The

Golden Star vein has a strike of about north 35° west. North of the shaft there is no evidence of the continuation of the vein visible at the surface on the Golden Star property, owing to the fact that the rock is not well exposed, although on JO41 a vein outcrops which will be mentioned later. The first evidence now visible of the vein on the surface is in a test pit eight feet deep and 80 feet south of the shaft. The vein is six feet seven inches wide, and consists of four stringers of quartz, aggregating two feet seven inches. About 20 or 30 feet south of this the vein branches, one branch bending to the east slightly and the other to the south, the latter with a strike of north 15° west. The evidence of this consists of lines of faulting more or less distinct, with occasional outcroppings of quartz, the rock being covered more or less with soil and a sparse growth of bushes and small trees. At a distance of 60 or 70 feet south of the first mentioned test pit an exposure of the vein occurs, with two or three stringers of quartz aggregating 14 or 15 inches and a distance between the walls of over four feet, only one wall being exposed. The fault line evidently branches again south of this, the most easterly branch of which consists of a distinct line of faulting, visible a little over 200 feet from the main shaft. The central branch is shown by a five-foot test pit about 230 feet south of the shaft. There are two distinct walls five feet apart, with an inch stringer on the hanging and a six-inch stringer on the foot wall. The west branch is traceable by a line of faulting for over 350 or 400 feet south of the shaft. At a distance of about 300 feet from the shaft a test pit has been sunk 22 feet on this branch, which is from two to eight or ten inches wide on the surface at this point. A considerable quantity of felsite occurs south of the shaft, which gives rise to the theory that the vein is contained in a felsite dike, but such is not the case.

A systematic examination of the vein underground was made according to directions.

The workings were measured up and plotted to scale as per accompanying sketch (the dotted outlines of stopes being approximate). The

depth of the shaft, as near as it can be arrived at, is 380 feet. There are five levels, with an aggregate of 930 feet of drifting. The amount of stoping done is best shown by the sketch. The width of the stopes is extremely variable, ranging from 18 inches to about 12 feet. The numbers on the sketch indicate the points at which the vein was measured and sampled for assay. The positions of these points are also plotted to scale. The vein in the shaft was sampled on the north end at every five feet of depth, with a few unavoidable variations. In the drifts and stopes the distance between the points of sampling was made greater. Usually samples were taken at all accessible points, at reasonable distances apart. In many parts of the stopes access was impossible, owing to the lack of timber, etc. The north end of the second level could not be reached, but from previous inspections the vein there is known to be unpromising in appearance. At the north end of the overhand stope in the same drift there appears to be no vein as far as can be seen. It pinches out near No. 125. Corresponding to surface conditions, the conspicuous feature south of the shaft is the branching of the vein, which is well defined in the first, second and third levels; and this is in accordance with what would be expected from surface indications. At the fourth and fifth levels not sufficient work has been done to demonstrate the nature of the vein in this respect at those depths. The dotted line shows approximately the line of branching of the vein as far down as could be determined. The last 17 feet of the first level is on the west or hanging wall branch, the vein dipping to the west. In the second level the south drift was commenced on the hanging wall branch and ended upon it, the central portion being widened out to include both branches. In the third level south the vein branches three times, but not very strongly. The widest and best portion of the vein occurs at what may be called a junction of the branches, or just north of the line of splitting of the vein, as suggested by the stoping done. As far as development work reveals, the workable portion of the vein consists of a shoot from three to 12 feet in

width and about 100 feet in length, extending through all the levels and pitching to the north. The walls of the vein are well defined in almost all parts of the workings. Places in which the vein is frozen to the walls are rare. The wall rock is usually decomposed next to the vein, and selvage is common. At the ends of the drifts beyond the main ore shoot the veins or branches are usually fairly definite, although selvage does not occur to the same extent. In some cases only one wall is reached. Near the surface the ore shoot is mainly south of the shaft and crosses to the north as shown, and gives evidence of continuity on that side of the shaft. At the ends of the first three levels south the branches of the vein, although well defined, are comparatively small. Mr. Flaherty, the manager, intends to drift further on the west branch of the vein at the second level towards the 22-foot test pit south of the shaft, where there is promise of a payable body of ore, and crosscutting will be done in both directions. The fourth level south is rather discouraging in appearance, but the fifth level shows a fairly strong vein south of the shaft. In the north drifts of the upper levels especially the country rock changes from the usual felsite or porphyry to greenstone; the contact cannot however be easily located. But this may be only a dike which would be passed through on further drifting. The vein is strong at the ends of the drifts, and it is possible that further drifting may reveal workable ore. In the shaft the vein varies considerably in width. A few feet of broken rock prevented access to the bottom of the shaft, but as far as can be seen the vein in the lower portion of the mine is wider than usual, the foot wall not being reached at all in parts of the workings, but the quartz is lean looking and the walls have little or no selvage. The character of the ore varies considerably in different parts of the mine. I understand that a very rich body was found between the second and third levels north. Mr. Flaherty struck the continuation of this, though much narrower, while stoping in the fourth level, and he informed me as I was leaving that there were evidences of its coming in at the fifth level

north also, where stoping and drifting were in progress. In the fourth level stope the rich streak is only from six to eight inches wide and extends along on the hanging wall side of the vein. It is heavily charged with galena.

Before the stamp mill was installed and in operation, which was on 9th November, 1898,

Suspension of Development Work by the former Owners. the shaft was considerably over 300 feet deep and four levels had been established with an aggregate of over 700 feet of drifting, besides

upraises and winzes. This meant, of course, besides the large amount of ore blocked out, an extensive ore dump on the surface. Since the mill has been in operation development work has been practically suspended, with the exception of the establishment of the fifth level and a little drifting at the third and fourth levels. For the past six months practically no development work has been done, until lately under the new management. Thus, with a large amount of ore blocked out and a dump on the surface representing the product of development work, completely equipped hoisting, transportation and milling plants, the owners were enabled by a knowledge of the distribution of the different grades of ore under ground to stope out accordingly and govern the output of the mine from month to month as they desired. By suspending development work, and otherwise keeping down temporary expenses, the profits were additionally enhanced for the time being. But although the blocked out portion of the mine has been mostly gutted, there is no reason why development work should not even now be kept sufficiently advanced to keep the mill running steadily. The ore shoot has every appearance of continuity and depth, and the vein shows no positive indication of discontinuance in length. The present management must pursue a conservative policy for a few months, until development work has been sufficiently advanced to insure a future reserve compatible with the capacity of the mill.

The mine was left by the old management in a poor condition. The timbering in the stopes was meagre; the loading stations in the shaft are not safe; the ladderway requir-

ed considerable improvement, and the skipway was insecure, besides other matters of

Condition of the Mine. less importance. Under the new management these defects are being remedied as fast as convenient. The ventilation is not very satisfactory at present.

An air shaft to connect with the north end of the first level was advised. There is a considerable quantity of water coming down the shaft, but this is easily controlled by a pump at the third level and one at the bottom of the shaft. Machine drills operated by compressed air are employed; five are in use altogether for stoping and development work. The hoisting plant includes a skipway constructed as far as the fifth level, with a 2000 lb. skip, automatically dumping at the surface; a $\frac{3}{4}$ -inch steel wire hoisting cable; a duplex hoist with $8\frac{1}{2}$ by 12-inch cylinders; band brake and friction clutch; and drum 42 inches in diameter. Owing to the irregularities in the shaft the skiproad is poor, the exercise of considerable care being required to prevent the skip from leaving the track. This can be avoided by providing proper back timbers, such as has been done from the surface to the first level. Instructions were left to provide such timbers for the full length of the skiproad. A small auxiliary hoist has been provided at the fifth level for sinking in the shaft, which work has been delayed pending the arrival of the needed machinery. A satisfactorily timbered penitence has been constructed under the skipway. Tramways are laid in all working levels. The ore stoped out is broken down upon a row of stulls with mill holes in these to convey the ore to the cars in the levels. Both overhand and underhand methods of stoping are employed.

The ore is conveyed to the mill on an Otto Aerial Tramway 2700 feet in length. The

Tramway from Mine to Mill. uneven contour of the ground necessitates ups and downs in the cable way, which is supported by

fifteen standards at varying distances apart. The discharge terminal is 10 feet lower than the loading terminal. Three or four horse power is sufficient to operate the tramway. Ten buckets are in use having a capacity of 500 lb. each and a speed of about $4\frac{1}{2}$ feet

per second. The buckets dump directly into the crusher at the mill. The tramway, and of course the crusher also, only runs 10 hours out of the 24. One man is required at each end to load and unload the buckets, etc. Fifty feet of tramway extends from the shafthouse to a pocket at the loading terminal. This pocket (lately constructed) has six separate lips for the discharge of the ore into the buckets. The different grades of ore can be thus kept separate, and mixed as required in order to maintain a uniform output of bullion.

The stamp mill, which is on JO41, has a very good site on the Bad Vermilion lake.

The foundation is solid rock. The buckets discharge at a sufficient elevation to admit of all handling of ore and tailings by gravity. The building is commodious, and substantially and neatly constructed. The machinery consists of the following :

- 1 Comet D Crusher with a 100-ton ore bin underneath.
- 2 Batteries of 5 stamps each.
- 2 Challenge Ore Feeders.
- 2 Brown's Two-Compartment Hydrometric Sizers.
- 4 Frue Vanners with 6-foot plain belts.
- 12" by 36" Corliss Engine and two 80 h.p. Boilers, besides the Air Compressor.

The mill and other buildings in connection with the mine are lighted by a 60-lamp dynamo. Mr. Flaherty estimates the capacity of the mill at 30 tons per day, but it is possible that this figure would be found too low if an exact method of estimation were employed. Mr. Kerr, the former superintendent, told me that about 35 tons on an average were being treated daily, and as much as 41 tons had been put through in 24 hours. The ore of course varies in hardness, richness, and in free-milling character. Rich ore with a considerable amount of concentrates requires longer treatment, and hence reduces the capacity. The following details of mill practice are now adopted : Weight of stamps 920 lb. ; number of drops, 96 per minute ; height of drop, seven inches on an average ; materials of shoes and dies, forged steel ; depth of discharge, variable, usually from $\frac{1}{2}$ to three inches, although the range extends from $1\frac{1}{2}$ to eight inches according to the nature of the ore. Rich ore with a large

percentage of concentrates requires a deep discharge, thus allowing of finer comminution and longer treatment. Screens, 40-mesh diagonal slot, with area of 4' 2" by 9 $\frac{1}{4}$ ", single discharge. No inside amalgam plates are used. Apron plates, 12' long by 4' 7" wide with $1\frac{1}{2}$ " drop in centre ; inclination, $1\frac{3}{4}$ " per foot. There is only a small percentage of concentrates in the ore, as is usually the case with the mines of Western Ontario, but their value is high. They are not treated at the mine. The hoisting, transportation and milling machinery is in a satisfactory working condition and has been installed with a view to reasonable economy to the handling of the ore. About seven or eight cords of wood per day are used at the mine and mill, and it costs delivered \$2 37 $\frac{1}{2}$ per cord.

The following buildings are on the property : Shaft house, engine house, blacksmith's shop, dry, store house, mill building, tramway terminals, office, powder magazine, boarding camps, stables, several private dwellings, and others. The following force is employed : In connection with mining—four drill men, four trammers, three timber men, two landers, two engineers, a blacksmith, and several temporary laborers. The mine captain is Mr. E. J. O'Brien. In connection with milling—superintendent, George M. Kugler, a carpenter, a night amalgamator, two engineers, two firemen, wood passer and helper in mill. In connection with transportation of ore—one man at each terminal.

Mr. Flaherty furnished me with the following summary of costs per ton : Mining Costs and Wages, \$2.78, milling \$1.34, and transportation 17 cents, making a total of \$4.29 per ton. Wages are higher here than in other parts of the district. Machine men are paid \$2.75 a day (\$3 at some of the mines in the vicinity,) and other workmen in proportion. Board is obtained for \$20 to \$22 per month.

A small steamer is employed by the Company for the transportation of supplies, &c., on Bad Vermilion lake. The Government road from Mine Centre, which is at a distance of $4\frac{1}{2}$ miles, has been in poor condition for the greater part of the

season, but improvements are now in progress.

In the selection of the samples from which the assays were made a piece from half to three-quarters of a pound was taken at intervals varying from a fraction of an inch to eight or ten inches, according to the width of the vein and the character of same. Where the vein was narrow, from a couple of inches to eight or ten inches in width every inch across was sampled. Where the width was about five feet or more, pieces were taken at equal intervals of six, eight or ten inches, according to circumstances. For other widths of the vein intermediate pieces were taken at correspondingly smaller intervals. At each place sampled the pieces were of uniform size, or a uniform amount was

taken at the different points across the vein as nearly as could be judged, and at equal distances apart, although, as stated before, if the vein were narrow or the quartz variable in character the pieces were taken at smaller intervals or more frequent than if the vein were wide or uniform in character. Considerable care was exercised to have a thoroughly uniform sample in each case, so that the assay value would represent the average value across the vein at that point. The samples were taken by hammer and moil, with the assistance of a miner, and they were put up and sealed under my direct supervision for shipment by express to the assaying office at Belleville. The results obtained are given in the following table.

Assays of the Samples.	No.		Width of vein.		Width of quartz.		Assay Value.	Remarks.
			Feet.	In.	Feet.	In.	\$ c.	
	1	3	7		1	6	1 65	Total width of vein sampled unless otherwise stated.
	2	3	10		3	0	1 85	
	3	4	9		4	9	—	The vein at all points sampled possesses definite foot and hanging walls except where otherwise remarked.
	4	6	1		5	11	trace	
	5	6	3		4	7	—	
	6	6	4		3	10	1 22	
	7	5	8		5	8	trace	
	8	6	0		6	0	—	
	9	7	4		7	4	1 65	
	10	6	7		6	7	1 20	
	11	6	3		6	3	trace	
	12	6	0		5	8	—	
	13	5	4		4	10	trace	Foot wall not reached between fourth and fifth levels except near the fourth.
	14	5	3		4	6	—	
	15	4	3		4	3	1 44	
	16	4	0		4	0	5 98	
	17	4	0		4	0	33 04	
	18	3	0		3	0	6 60	
	19	1	1		1	1	1 22	
	20		11		11		82	
	21	2	6		2	6	trace	
	22	3	0		3	0	1 02	
	23	2	0		2	0	23 57	Vein pinched out entirely between 24 and 25, leaving only a seam.
	24	1	5		1	5	5 57	
	25		2½		2½		—	Quartz in two branches 7" on hanging and 13" on foot. Quartz only sampled.
	26		6		3		trace	
	27	2	9		2	7	3 51	
	28	4	10		1	6	2 88	
	29	4	3		1	2	1 02	
	30	9	10		1	8	trace	
	31		7		7		7 43	
	32	4	4		3	10	8 46	
	33	2	10		—		84	
	34	1	8		1	3	1 02	Stringers of quartz mixed with felsite.
	35	1	0		10		1 44	
	36		8		6		3 91	Vein pinched out between 35 and 36, leaving a distinct seam.
	37	1	2		9		3 09	
	38	1	5		1	0	35 47	
	39	1	4		1	0	3 91	
	40	1	9		1	9	5 78	
	41	1	0		1	0	5 57	
	42	1	6		1	6	2 47	
	43	3	10		2	6	15 28	

Assays
of the
Samples

No.	Width of vein.		Width of quartz.		Assay Value.	Remarks.
	Feet.	In.	Feet.	In.	s. c.	
44	4	10	4	0	8 05	Total width of vein sampled, unless otherwise stated.
45	2	10	2	10	50 63	Foot wall not reached.
46	2	0	2	0	56 58	
47	1	3	1	0	3 36	
48	2	0	1	7	10 11	
49	1	3	1	3	34 89	
50	2	0	2	0	4 74	
51	2	3	2	3	9 70	
52	2	6	2	6	4 54	
53	2	10	1	6	3 52	
54	3	0	3	0	4 33	
55	3	5	2	7	117 06	
56	3	3	2	3	1 44	
57	2	2	2	2	11 97	
58	1	8	1	8	74 92	
59	10		10		2 68	
60	1	0	11		trace	
61	1	5	1	0	1 02	
62	1	8	1	8	1 44	
63	2	6	2	6	2 47	
64	1	9	1	9	3 09	
65	1	10	1	8	3 29	
66	1	6	1	6	10 73	
67	1	6	1	6	1 44	
68	1	7	1	3	84	
69	2	7	1	4	9 08	
70	2	3	1	6	43 15	
71	2	0	2	0	101 59	
72	2	10	11		45 63	
73	2	3	2	0	17 55	
74	1	10	1	10	17 16	
75	.....		.....		1 22	Sample of foot wall material adjacent to vein. Thick- ness of wall rock sampled, 2' 1", where slope has been suddenly widened.
76	.....		.....		2 27	Sample taken from about a dozen points on foot wall, covering a distance of 50 or 60', where portion of vein is left in wall.
77	1	1	1	1	17 34	
78	.....		.....		—	Sample of country rock across drift adjacent to vein on foot wall side. Width sampled, 1' 10".
79	7	8	3	0	7 43	Vein here really consists of two branches, one on each wall. Hanging wall branch, 1' 7". Foot wall, 1' 5". (Quartz only sampled.)
80	.....		.....		trace	Sample of country rock between branches of vein at 79. Width sampled, 4' 8".
81	7	0	3	3½	13 21	Vein in two branches similar to 79.
82	6	2	4	0	37 58	Whole vein sampled.
83	6	5	6	5	8 67	Country rock pinched out. Calcite mixed with the quartz in the centre of the vein.
84	3	6	3	6	4 54	
85	3	11	3	5	9 91	Quartz in foot wall of stope.
86	3	3	3	3	113 06	Quartz mixed with foot wall rock.
87	3	7	3	1	22 50	A little quartz in foot wall.
88	3	10	1	11	2 67	Walls rather indefinite compared to other places on vein.
89	1	1	1	1	2 89	The vein in the 2nd level south is in two branches. Hanging wall branch drifted on near shaft.
90	1	1	1	1	3 50	
91	6	3	3	8	2 27	Both branches of vein exposed at this point. Country rock between not sampled.
92	5	3	5	0	3 50	Country rock pinched out.
93	4	4	4	4	14 26	
94	4	4	4	0	trace	
95	6	2	3	4	82	
96	6	2	1	9½	—	Branching of vein in evidence here. Sample taken all across.
97	.....		.....		—	Branch on each wall. Hanging, 13½" quartz; foot wall, 8".
98	11	6	1	2½	1 22	Sample of country rock between quartz stringers or branches of vein at 96. Width, 4' 4".
99	.....		.....		trace	Only quartz sampled.
100	7		7		2 06	Sample of country rock between stringers at 98. Width, 10' 3".
101	3		3		1 44	Hanging wall stringer or branch.
102	2		2		82	Widens to 12' between 101 and 102. Hanging wall branch.
103	7		7		2 68	.....
104	9	10	5	0	2 26	Consisting of quartz and country rock mixed.
105	8	0	4	0	1 65	.....
106	7	10	7	10	3 10	
107	9	6	.....		1 86	A little country rock mixed with the quartz in centre.

Assays of the Samples	Width of vein.		Width of quartz.		Assay Value.	Remarks.
	Feet.	In.	Feet.	In.	s. c.	
						Total width of vein sampled unless otherwise stated.
108	11	10	2	4	2 47	Only 1 1/2' of quartz in hanging wall branch. Only foot wall branch sampled.
109		3		3	82	Foot wall branch.
110		8		8		" " "
111		2		2	1 62	Hanging wall branch. (Vein branched a second time.)
112	3	6	3	6	1 84	Foot wall branch.
113	7	6	2	6	5 99	Only foot wall branch sampled. A little quartz is mixed with the country rock right across drift. Hanging wall branch very small.
114	6	6	2	1		Vein branched again near end of drift. Only the quartz sampled.
115	7	0			84	Sample taken across roof of drift consists of quartz and country rock mixed, mostly country rock. Branches of vein on each side small.
116	6	0	1	3	84	Sampled all across. Quartz mixed with the foot wall rock.
117					1 22	Sample of vein matter consisting of quartz and country rock mixed. About 2' in thickness on foot wall.
118					84	Sample taken along crosscut. All country rock. Sampling commenced 18" from vein. Taken across a distance of 7' 8".
119					1 22	Sample of about 12" of vein matter, (quartz and country rock mixed) in foot wall.
120					trace	Sample of vein matter left in foot wall. Sample taken from several points along wall of drift.
121					1 02	" " "
122	2	11			30 79	Mostly quartz. Sample of vein. Both walls exposed.
123	3	0	1	8	21 91	Quartz in several stringers.
124	2	1 1/2	2	1 1/2	19 01	
125		9		9	3 20	
126	3	9	3	9	1 02	
127	2	4			15 70	127 is a continuation of 126, there being 2' 4" of quartz and felsite mixed, adjacent to the vein on foot wall.
128	3	10			2 47	Quartz and felsite mixed, mostly quartz. Foot wall indefinite.
129	3	4		6		Stringers of quartz in felsite. Walls are not very definite.
130	2	10 1/2	2	10 1/2	32 45	
131	2	8	2	6	84 12	
132	2	1	2	1	56 42	
133	1	1	1	1	20 23	
134	1	0	1	0	7 01	
135	2	0	2	0	67 79	
136	1	10	1	10	10 06	Quartz in foot wall mixed with country rock.
137	1	10 1/2	1	10 1/2	41 14	Stringers of quartz in foot wall.
138	3	7	3	7	17 77	
139	4	0	4	0	13 43	
140	3	0	3	0	25 21	
41	2	4	2	4	19 02	
142	2	1	2	1	31 21	
143	1	8 1/2	1	6	33 89	
144	1	8	1	8	17 97	
145	3	2	3	2	84	
146	3	8	3	0	4 96	
147	4	3	4	3	3 72	
148	4	7	4	7	2 06	
149	5	0	4	0	1 62	Quartz in foot wall.
150	1	11	1	11	1 82	
151	1	5			3 64	Mostly quartz. Slightly mixed with country rock.
152	2	5	1	11	trace	
153	2	0	2	0	59 52	
154		11			2 47	Mostly quartz. Mixed.
155	1	2	1	2	5 37	
156	2	0	2	0	4 12	
157	6	7			1 62	On hanging side of vein is a well defined quartz body 2' wide, with definite walls. Remainder of vein is mostly quartz mixed with country rock. Regular foot wall not reached.
158	3	4	2	5	1 82	Definite vein 2' 5" on hanging side. Sample taken across roof of drift. Regular foot wall evidently not reached.
159			2	1	62	Definite vein on hanging side. Sampled across roof of drift. Width 4' 5". Rock on foot wall side consisting of quartz and country rock mixed, mostly country rock.
160	3	3			82	Mostly quartz; 8" or 10" of felsite on foot wall side. Vein narrower at bottom.
161	4	4	4	4	62	Foot wall not reached.
162	5	8	5	8	82	
163	6	4	6	4		

Assays of the Samples	No.	Width of vein.		Width of quartz.		Asses- Value.	Remarks.
		Feet.	In.	Feet.	In.	\$ c.	
Assays of the Samples	164	6	8	6	0	trace	Total width of vein sampled unless other wise stated. No selvage on hanging wall. A little on foot wall. Hanging wall indefinite. Foot wall definite with sel- vage. Sample taken across a horse of country rock, width 2'; a little quartz mixed with the rock. A little stringer of quartz had been followed by the drift, under the belief that it was the hanging wall; but the drifting and stoping is now carried on east of this, where a wide body of quartz (the regular vein) was crosscut. Samples taken only where possible, the timbers having been removed. Shaft timbered to first level. Sample taken across 2' 6" of the vein, starting at foot wall side. Hanging could not be reached. Sample taken at mouth of 22' test shaft over 300' south of main shaft. Sample from 1st test pit 80' south of shaft. Quartz in four distinct stringers. Definite walls. Test pit 8' deep. Point where sample taken shown on plan. Samples from 22' feet test. Shaft over 300' south of main shaft. Depth of sample, 21' 10", north end of shaft. Same depth at opposite end of shaft. Depth, 16' 3". Foot wall indefinite; hanging definite, showing selvage. Good hanging wall; indefinite foot wall; depth, 13' 2". Depth, 7' 5".
	165	5	10	5	10		
	166					2 36	
	167	5	5	5	5	trace	
	168					82	
	169					2 06	
	170	4	2	4	2	3 36	
	171		2		2	2 26	
	172	6	7	2	7	1 02	
	173		8½		8½	82	
	174		8½		8½		
	175		11		11	62	
	176	1	8	1	8	1 24	
	177	1	0	1	0	1 02	

The average value of the 177 samples is \$10.31, which must be regarded as quite satisfactory in view of the fact that the samples were taken fairly from all parts of the workings, regardless of the quality of the ore. With selected ores such as would be possible for milling when development work is adequately maintained, it is obvious that a considerably higher average might be looked for; but with ample supplies of ore blocked out, and the milling capacity doubled (as is planned by the new management), an average of \$10.31 per ton would assure the payment of liberal dividends.

Locations adjoining Golden Star.

JO41 is a location of 105 acres adjoining the Golden Star property on the northwest.

JO41. The Golden Star vein has been generally spoken of as extending on to JO41 property. The greater part of this property is covered by swamp and bush, and the vein could not be traced northward without great expense in stripping. But there is a vein outcropping at a distance of 1,300 feet northwest of the Golden Star shaft, where the first exposure of rock occurs on JO41. It may be the continuation of the Golden Star vein, but I doubt it, as the variation of

strike would necessarily be considerable. This outcropping is three or four feet wide, and is exposed at both ends of a test pit sunk a few feet upon it. The walls are fairly well defined, but the vein is only traceable for a short distance at this point. About 800 feet farther north, on about the same line of strike and separated by a muskeg, the ground rises rather abruptly, exposing a vein one to 2½ feet in width and traceable for over 100 feet. This probably is the continuation of the preceding vein. Near the southwest corner of JO41 and 50 or 60 feet from the eastern boundary an outcropping of quartz 10 feet wide occurs. This is the continuation of the vein which is traceable for over 500 feet with a strike of about north 60° west on the adjoining location. Over half the vein is stripped. It averages 2½ or three feet in width and has well defined walls. The country rock is massive greenstone. The vein certainly looks promising.

On the western side of AL114 a quartz vein outcrops which is traceable for over 200 feet with a strike of about north 40° west. It ranges from a few inches to two feet in width. Near the southeast corner of AL116 an outcropping four feet

wide occurs which is a continuation of the Randolph vein on AL115.

What is known as the "Randolph Farm" or mining location AL113, adjoining the

Randolph Farm. Golden Star on the west, has recently changed hands, and operations have been commenced by the present owners.

There were on August 12 only three miners at work test pitting, but a double crew was to have been put on in a few days and camps erected. Mr. Neil Berger is foreman of the work. The formation is similar to that of JO41. There is a strong quartz vein of a promising appearance traceable for five or six hundred feet, from two to 10 feet in width, with well-defined walls and a strike of north 15° to 20° west. The quartz contains copper and iron pyrites, galena and zincblende. Two test pits have been sunk about 300 feet apart on the vein; one $3\frac{1}{2}$ by 10 feet in cross-section by 10 feet in depth, showing the walls well separated from the vein matter; the other six to eight feet in cross-section by eight feet in depth, apparently on a junction of this vein with another.

Work is also in progress on AL115, a 40-acre location adjoining the Golden Star on

Randolph Mine. the east, known as the Randolph mine, and owned by the Randolph Gold Mining Company of Ontario, Limited.

The formation is a continuation of that of JO41 and the Golden Star, with conglomerate on the south half of the location. The vein is traceable for about 500 feet on the surface and varies in width from a few inches to three or four feet. A six by eight foot shaft is being sunk which on July 20 was 54 feet in depth. A small steam hoist is employed. A shaft house, blacksmith shop and boarding camps have been erected. There are six miners working in day and night shifts and four other workmen, under the superintendence of Mr. Neil Berger.

Olive Mine.

The Olive ore body consists of a small, rich quartz vein in a large body of felsite schist.

An extensive Band of Gold-bearing Rock. A two-stamp mill was installed two years ago which successfully treated the quartz from the small vein, and also a certain amount of the felsite schist adjoining the vein. A ten-stamp mill

was erected last year with the object of treating a larger quantity of the schist, the quartz vein being too small for a mill of that capacity. As a result of continued testing the opinion grew that the whole body of felsite schist, several hundred feet in width, contained sufficient values for treatment by a large mill. This summer diamond drill testing was done with a view of determining the values contained in the schist and the width of the body. Two horizontal holes were bored at the bottom of the main shaft, a depth of 245 feet. The first hole north for a distance of 150 feet revealed 132 feet of an ore body and 18 feet of diorite beyond. The second hole was bored south from the end of the crosscut, revealing 218 feet of ore and 20 feet of diorite. This makes altogether, including the crosscut, a width of about 425 feet of ore, with an indefinite length and doubtless great depth. Whether the ore is sufficiently high grade for treatment even with a large mill is a matter that has yet to be settled. However, the foundation is being prepared for an additional 15-stamps to be installed this fall alongside the present mill. This will of course necessitate the treatment of a still greater proportion of the schist, or "dike" as it is erroneously called. It is not likely that a further increase in the milling capacity will be made after this until the new railway (which passes within a very short distance of the mine) is in operation.

The main shaft is 251 feet deep, with sinking suspended for the present. There are three levels, with a total amount of Sinking and drifting. drifting of 615 feet, and $72\frac{1}{2}$ feet of crosscutting. Considerable stoping has been done in the first level east and west, and a little at the third level west. A good body of high grade ore was passed through in the third level west. Shaft B, which is 345 feet east of the main shaft, is 70 feet deep, with 262 feet of drifting at the bottom. An additional 90 feet of drifting west will make connection with the east drift at the first level of the main shaft, thus affording good ventilation as well as giving a large amount of stoping ground.

Drilling is all done by compressed air. Five machines are in use. No stoping is in

progress at present. The 10-stamp mill is kept supplied by the product of development work, five drifts being under way altogether. Mr. N. B. Hall is manager of the mine. There is a total force of 52, including 22 miners.

On G69 (a part of the Olive property) a shaft is being sunk on a band of green schist impregnated with quartz and heavily charged with pyrites. The shaft was 29½ feet deep at the time of my visit, with crosscutting commenced north and south at the bottom.

Swede Boy Mine.

The Swede Boy mine was visited on August 9th. This property is situated about four miles east of the Olive, and consists of location E237, owned by the Headlight Gold Mining Co. of Ontario, Limited. John McLeod is manager, with a total force of 13, including eight miners. The formation consists of dark green schist, impregnated with small seams of quartz and charged with pyrites. There are two quartz veins about 100 feet apart and parallel to the strike of the schists, which is nearly east and west. These are exposed at several points with a width of from three or four to eight or ten feet. A shaft has been sunk 81 feet on the north vein. At a depth of 75 feet a cross-cut has been driven south towards the other vein 40 feet, and one north 16½ feet. It is possible that the rock between the veins may be ore. A small steam hoist is employed, and office, boarding camps and engine house have been erected.

Lucky Coon Mine.

The Lucky Coon mine, recently bought by the Lucky Coon Gold Mining Co., has been in operation by that company since early in the spring, after several years of suspension of work. There are five shafts on the property, on different veins. Two of these have been worked all summer. One, No. 5, has been recently temporarily closed down owing to inadequate ventilation. It is said to be 78 feet deep, but is half full of water. The other working shaft, No. 2, is 108 feet deep. Drifting will be commenced at the 100-foot level as soon as a few feet more has been sunk. The shaft is on a good strong vein

with a nearly vertical dip. Parallel veins also occur on both sides which can be economically reached by crosscutting from the same shaft. Steam hoists will be installed immediately, one at each shaft, and work on No. 5 resumed. There are at present three miners and three surface men employed under the managership of Mr. A. W. Robertson.

Ferguson Mine.

The Ferguson mine is owned by the Seine River (Ont.) Gold Mining Co., Limited, with head office at 1 Castlecourt, London, Eng. While I was in the vicinity the shafts were all pumped out and examined by a Cornish mining engineer named John Angove. If the report is satisfactory work will doubtless be resumed.

Golden Crescent Mine.

The Golden Crescent mine, formerly known as the AD2, has been bought by the Golden Crescent Mining and Exploration Co. of Ontario, Limited, with head office at Duluth, Minn. Work has been resumed this spring after a period of suspension. The shaft on the Gem vein has been sunk to a depth of 88½ feet, and a little work done at one or two other places on the property. A steam hoisting plant has been installed. Mr. W. G. La Rue is manager of the mine. There is a total force of eleven, including six miners, working by day and night shifts.

Decca Mine.

There are two shafts on the Decca, about 1,200 feet apart on the same vein. No. 1 is 115 feet deep and will be continued to 150 feet before drifting is commenced. Steam hoisting and air compressing plants have been installed. No. 2 shaft is 110 feet deep. Operations in it are temporarily suspended. Mr. F. C. Fisk is manager of the mine.

Manhattan Mine.

The Manhattan consists of location K231, adjoining the Decca, and owned by the Manhattan Gold Mining Co. of Canada, Limited; head office at Montreal. The vein is one of the widest known in the protogine. A shaft has been sunk 100 feet and 40 feet of cross-cutting done at the bottom, exposing 16 feet of quartz. Steam hoisting and drilling plants have been installed. The property was ex-

anned by John E. Hardman, M.E., of Montreal, during my visit, and work which has been suspending, pending the results of Mr. Hardman's investigation, will be resumed immediately. Mr. Frank Peterson is manager.

Alice A. Mine.

The Alice A. mine is reported to have been sold to an English company under an agreement to install a large mill of 100 or more stamps. At present sinking in a test shaft is in progress. A depth of 95 feet has been reached. At 100 feet crosscutting will be done in both directions, and sinking continued at the same time. A steam hoist and small compressor have been installed. A two-stamp Tremaine mill, still on the property, made some mill runs from test pits at various points, with apparently satisfactory results. Mr. T. D. Prideaux is manager, with a force of 14 or 16.

Gold Bug and Emma Abbott Locations.

The Gold Bug, P660, and Emma Abbott, K215, were both visited and examined.

They adjoin the Alice A. on the west and east respectively, and contain the extension of the same body of ore. Small test pits have been made on veins on each property. Both properties are promising looking, especially the Gold Bug, which is full of small quartz stringers and should carry gold uniformly.

Foley Mine.

The Foley mine remains in the same condition as at the former report; it is continually stated that work will be resumed immediately.

Independence Mine.

The Independence mine, near Sturgeon Falls, has been closed down for some time, but it is expected that it will be opened again very soon.

On the whole, mining in the Lower Seine is in a very healthy condition. The people of Duluth and of the eastern cities are taking more interest in the district than ever. When the railway is completed there will doubtless be a great boom in that section.

NOTES ON WORKING MINES

By J. Watson Bain

DURING the summer of 1898 the writer was instructed by the Council of the School of Practical Science to carry on Summer Mining Schools at several points in Western Ontario, under an arrangement with the Bureau of Mines, and in addition to the regular work it was decided that a series of visits should be paid to the working mines in order that, wherever possible, addresses of an instructive nature should be delivered to the miners. In the performance of this work an opportunity of inspecting many of the mines was afforded, and the following notes are the results of these visits.

Mr. James A. Bow, the Inspector of Mines, whom I accompanied on his first visit of inspection for 1898, describes minutely the condition of each mine and its adjuncts, and the observations which follow are intended to be complementary to these descriptions by dealing with the more general aspect of the work.

Silver Mountain Mines.

While at Port Arthur in May a visit was paid to two of the old silver mines, the East and West End Silver Mountain, which after a long period of idleness were being operated once more. At the West End 21 men were at work under Captain Tonkin and very encouraging results were being obtained. There are four shafts in all, but only in one, which had been pumped out to the 100-foot level, was there any active work in progress. The vein, which strikes 105° and dips at about 80°, is somewhat variable in width. At the working shaft, No. 2, a cross-section of five feet can be seen, while in a tunnel driven to crosscut the vein 850 feet to the east only three small lodes, 10", 18" and 22", are to be seen. It is quite probable that the vein has split up into these several branches at some intermediate point, although this cannot be seen from the present workings. Two small stringers, with a gangue

chiefly of barite, meet the main vein on the north side at a small angle; rich deposits of silver were found at the junction in each case. The vein filling consists of well crystallized calcite with green fluorite, yellowish barite and a little amethystine quartz, together with native silver, argentite, zincblende, galena and a little pyrite. The manner in which the argentite or sulphide of silver occurs is quite interesting. In several places along the north or hanging wall it had been deposited in the partings of the slates, and after knocking down a few loose fragments leaves of the mineral quite as thin as paper could be stripped from the flat surfaces of cleavage. The rich ore is carefully put aside in the mine and the contents of each bucket are subjected to a careful hand picking at the surface, while the poor ore is dumped on the stock pile to await treatment in the stamp mill.

At the East End mine the old workings are quite extensive, including a shaft 800 feet deep and a tunnel 1,800 feet long, but as work had just been commenced and there was still a great deal of water in the mine there was not much to be seen. The vein, which is continuous with the one at the West End, is much the same in appearance and general characteristics.

No other properties in the district were in operation, so that we may pass on to Wabigoon where the next stop was made.

Western Gold Mines.

About a mile north of the town is the Northern Queen mine, with its curious ore so heavily charged with sulphides of iron, as described in the Seventh Report of the Bureau. The shaft, said to be 50 feet deep, was full of water, so that it was impossible to determine whether the common report that sulphides were diminishing in quantity as the depth increased was true or not. However that may be the deposit is

almost unique in western Ontario, and resembles somewhat closely the auriferous pyrites and pyrohotites of Rossland.

Circumstances prevented me from visiting any properties in the Manitou district, and all save one in the New Klondike region, one of the most recently discovered gold fields. This property, which is known as Tabor and Stevenson's claim, is situated near the falls of Long Lake river, SV258, and is interesting because of the occurrence of the ore as a series of lenses along the edge of a dike of felsite cutting chlorite schists. The quartz is white or slightly yellowish in color, and gives a very handsome 'tail' of gold in the pan, but from the surface indications and from what could be seen in the six feet of shaft which was not under water only a small amount of good ore could be obtained.

Turning next to Lake of the Woods, work was progressing steadily at the Mikado with a staff of about 60 men. The main shaft, which is vertical, has struck the lode at a depth of 185 feet, and crosscuts are driven every 60 feet to connect with the levels. A considerable body of felsite, said to run \$40 to the ton, is found on the second level, and this was being opened up at the time of our visit. The mill is not equipped with any concentrating machinery, and the installation of a cyanide plant, which is being carried on at present, will add greatly to the efficiency of the plant.

At the Cornucopia and Ontario Limited everything was at a standstill, with shafts full of water, so that we pushed on to the Yum-Yum. Here one is struck with the large amount of prospecting work which has been done, and some of the veins, after stripping, look quite promising; no work was in progress however.

Four miles to the west of Yum-Yum lies Cameron island, only some 200 yards across. On the north side, at the water's edge, can be seen exposed a dike of felsite which shows an interesting structure. A band of black felsite 18 or 20 inches in width is bedded between walls of the same rock, but red, or whitish green in color. The black material shows signs of slickensiding, and the whole occurrence would seem to indicate two

separate generations of dike matter. The strike is almost north and south, and close to the centre of the island. The main shaft, 6 by 12 feet, increasing to 7 by 14 feet, had been sunk at a slight incline to a depth of 103 feet upon a somewhat wider section of the dike. The ore may be described as a felsite more or less intermixed with quartz, so that while some portions have the characteristic appearance of the latter mineral, others resemble the barren country rock very closely indeed. The whole veinstone is quite heavily charged with pyrites, which appears as strings of fine crystals along the seams in the ore. A lot of 200 tons is said to have yielded \$12.40 per ton at the Keewatin reduction works, although picked quite indiscriminately—a result that should certainly encourage further exploitation.

Another locality which has been brought into notice of late is the Camp Bay district, on the east shore of Whitefish bay. Two miles south of Camp bay is the property of the Boulder Gold Mining Co., of which Mr. Gifford is manager. A shaft was being sunk here on an 11-foot vein, which could be traced for a considerable distance, and although the ore was admitted to be low grade an ample supply could be had at a small expense for mining if the same width were maintained to a fair depth. There is always a possibility that there may be a marked improvement as the workings are extended, but even apart from this hope it is probable from the present aspect that those mines which are working upon ore of fairly uniform value, even if small, will be the more successful in their enterprise.

At Camp Bay, three-quarters of a mile from the water's edge, is the Bully Boy mine, which was idle at the time of our visit. The ore is a series of lenses in a dike of quartz porphyry, which cuts dark green rocks of Keewatin age. The shaft, over 100 feet deep, was partly filled with water, and little could be seen.

A mile further inland from the Bully Boy is the camp of the Combine Gold Mining Co. Development work was being vigorously prosecuted at a number of points, and the outcroppings on various parts of the locations

On Lake of
the Woods
Waters

had been carefully stripped. The most interesting deposit is that known as the Jumbo vein, about half a mile east of the camp. There, upon the top of a knoll, is exposed a large body of quartz four feet deep, resembling a true bed with slight dip. An open crosscut had been run into the mass, and it displayed a layer of quartz of the thickness just stated, resting upon the dark green country rock. A short distance away a shaft had been sunk to a depth of 21 feet with no sign of the ore body, so that at the time it was impossible to arrive at any reasonable conclusion as to the nature of this peculiar mass. Another vein 200 feet to the west is three feet wide, and dips 60° north-east; it has been opened up to a slight depth by a test pit, and gives good promise.

On our arrival at the Regina we found that the mill was being entirely reconstructed, and that no underground work was in progress at all. The shaft had reached a depth of 450 feet, and showed great improvement in the vein; a good deal of drifting had also been done and some stoping, in preparation for the start of the new plant. The old equipment, which consisted of ten stamps of 850 lb. each with two Perfection concentrators, has been replaced by seven Tremaine steam stamps and two 3-compartment jigs for concentrating, the tailings from which flow over gyrating amalgamated plates, and thence to waste. The concentrates are ground in Berdan pans, and pass to the cyanide tanks for leaching. The Blake crusher which was formerly used has also been replaced by a Gates gyratory rock breaker, which is said to be more satisfactory. The whole plant is a bold and radical change from the usual types of milling machinery, and the results of the experiment will be of much interest and value to all who are engaged in treating gold ores.

Three miles inland from the foot of Andrew bay lies the Stella property, under the management of Mr. Neil Campbell. There are three shafts at short distances from one another. The first and most easterly is sunk on a large fahlband, and was at the time full of water. The second was for the exploitation of a small but rich vein, and was also

full of water. The third is the present working shaft, and had reached a depth of 80 feet. The vein outcrops on the face of a hill at this point, and a tunnel had been driven on the lode for a considerable distance, exposing a mixture of quartz with a varying proportion of country rock, the whole being said to carry gold. At the mouth of the tunnel the shaft had been sunk with a dip of 75° on a body of ore of the same nature as that in the tunnel, and had reached that stage when a steam hoist was necessary.

Our next visit was to the well-known Sultana, which from the water presents the appearance of a bustling village. The new mill is first-class in all its appointments, with an equipment of the most approved design, and the process of ore treatment has been rendered complete by the installation of the chlorination works.

Another of the important gold fields of western Ontario lies at the mouth of Seine River, which, before pouring its waters into Rainy lake, expands into the shallow basin known as Shoal lake.

On the western shore of the latter sheet of water is the Foley mine, the most fully developed property in the district. At the time of our visit no work was being carried on, although the plant was in first-class condition for an immediate commencement.

Three miles to the north lies the Ferguson, Lucky Coon and AD2 properties, all of which were idle.

The mine which is being most actively worked at present is the Randolph or Golden Star, half a mile north of the Ferguson. The mining is done on a dike of felsite which carries lenses of quartz of varying size and shape, and in August the shaft had attained a depth of 300 feet, with a good showing of quartz at the bottom. The dike may be traced somewhat indistinctly up the hill to the south for a considerable distance, while to the north it plunges into a small valley and is lost beneath the drift. Just a short distance to the south of the shaft is the northern edge of that huge eruptive boss of granite upon which are situated the Foley, Ferguson, Lucky Coon, etc., and it is quite possible that the felsite represents an offshoot

from the molten granite, although this could not be determined for want of time. The country rocks at and near the shaft are porphyrites. A considerable quantity of ore consisting of a mixture of quartz and felsite, the latter carrying it is said fair values, had accumulated on the dump to be transported by a tramway to the shore of Bad Vermilion lake for milling. At this point a bench had been prepared on the side of the hill for the foundations of the mill, which has since been erected and put into service with satisfactory results. The distribution of the quartz throughout the dike is exceedingly interesting. As has been said above, the lenticular form is the most prevalent, although some of the lenses, to judge from sections afforded by the shaft and levels, must be quite irregular. To illustrate: The ore body in the first level south is at the shaft two feet wide; a few yards in, and the width increases to eight feet, which continues for a short distance and then splits into two divergent branches, six inches and 10 inches wide, which had not at that time been followed further. An encouraging feature of the deposit is the fact that with one exception the dike at all sections is of good width. It will probably continue also to great depths, and taking into consideration the felsite, which it may be possible to work as a low grade ore, the cost of further development should in a measure be met by the proceeds from the material excavated, even although the richer quartz may be entirely absent for a time.

Lying to the southwest of the Golden Star, at a distance of a mile and a half, is the Emperor, belonging to a Minneapolis company. A shaft was being sunk on two small veins and had reached a depth of 90 feet, showing a marked increase in the width of the lodes. From a level at the bottom of the shaft a crosscut was being driven to a cross vein which could be seen outcropping at some distance to the northwest. Operations were being vigorously carried on, and the company deserves credit for its enterprise.

Adjoining the Emperor to the south is the Decca, which was hardly as much developed as the former property. The shaft,

which was being sunk as fast as possible, exposes a good vein, and the venture has good augury of success should the lode prove rich enough.

Both of these properties are situated in the so-called protogine granite, within a few minutes walk of the Ferguson, AD2 and Lucky Conn.

Some eight miles northwestward of Mine Centre is the Olive or Preston gold mine, which has earned a reputation as a producer of the precious metal. The lode is one of the few bedded veins of the district, and is enclosed in dark gray compact schist of Huronian age. The width varies somewhat, but to a depth of 200 feet would perhaps average five inches. The quartz however is rich, and the small Alaska two-stamp mill crushing 12 to 15 tons per six days of 10 hours manages to produce some very nice gold bricks. The ore is rather heavily charged with pyrites, and the concentrates are estimated at five per cent. and quite rich enough to form a valuable asset. For lack of ventilation only a little work was being carried on during our visit, and until the arrival of the compressor plant, which was on its way, not much could be done.

With this our series of visits terminated, as it was impossible for me to visit the mines of the Upper Seine region. Al-

An Encouraging general Outlook.

though at a number of points one was disappointed by the abandonment of all work, in many places steady progress was being made, and the continual working of such mines as the Sultana, Regina, Mikado, Golden Star and Olive can hardly be construed otherwise than favorably. A number of prospects were being developed carefully in the different districts, and while the bustle created by the boom of 1897 was lacking, a feeling of determination to explore further had possession of many of the miners and owners to the great benefit of the industry at large. With two thoroughly equipped reduction works at Rat Portage, with cheap water carriage in most cases and low treatment charges, there seems to be no reason that custom work should not prevail on Lake of the Woods as it does in some of the Western States.

Geological Notes.

Half a mile south of the town of Wabigoon is the northern edge of a boss of intrusive granite which has not yet been noted on the maps. The mass has a northeasterly and southwesterly diameter of at least two miles, and is of unknown width.

Intrusive Granite at Wabigoon. The northern contact with the Keewatin rocks of the neighborhood can be seen very well on the shore of a small bay not far from Wabigoon, and presents the same evidence of its intrusive nature as can be seen at other well known localities on Lake of the Woods and Seine river. A small island three-quarters of a mile south is composed entirely of this rock. The granite is somewhat coarse in texture, and is of reddish color. Under the microscope it is seen to consist of crushed quartz, badly weathered feldspar and biotite, with numerous accessory crystals of sphene.

On location 200SV, three miles northwest of the town, there is an interesting contact, which is unfortunately covered by the drift. In approaching the location a series of massive greenstones of Keewatin age is passed over, and after a short traverse of muskeg an area of fine-grained, evenly laminated gray gneisses is entered on. Interbedded at intervals are beds of mica and tourmaline schist, with much the same texture and close foliation. These are probably members of the Couchiching

series, and if so are not likely as far as can be judged at present to contain deposits of any great value.

At the Emperor mine, three miles north of Mine Centre, there occurs a system of dikes so curious in certain respects that it has been thought worthy of description. The first is a large body of quartz porphyry, averaging in width 25 feet, which crosses the protogine granite of the locality in an easterly and westerly direction. The dike matter is yellowish in color, with good sized phenocrysts of quartz. It can readily be distinguished from the other rocks of the neighborhood. Passing directly through this once molten mass, and a little to one side, is a second dike consisting of a dark brown rock which has been so badly weathered at the surface that nothing definite can be determined as to its characters. In it are embedded rounded and angular boulders of protogine granite of all sizes and shapes. By tracing the system to the east the younger of the two can be seen to quit in part its host and branch off into the granite, while the other portion continues to accompany the quartz porphyry. The curious feature of one dike occurring within the body of another is quite unusual, and would repay more careful study than would be given in the short time at my disposal. No occurrence of this nature has been recorded by Lawson in his observations on the post-archæan dikes of the locality.

A Dike with in a Dike.

Contact of Greenstones and Gneisses.

SUMMER MINING CLASSES

Lectures to Prospectors

DURING the season of 1898 the Legislature's appropriation of \$1000 for Summer Mining Classes was divided between the

Instructors taken from the Toronto and Kingston Schools.

School of Practical Science, Toronto, and the School of Mining, Kingston, each school being authorized to select its own instructors

for the work. The western portion of the Province was assigned to the Toronto School, which was represented by Mr. J. Watson Bain, one of the teaching staff. The eastern portion was assigned to the Kingston School, which was represented by two of its teachers, Dr. W. L. Goodwin and Prof. William Nicol. An account of the work done by the instructors is here presented.

Mr. Bain's Report.

I have the honor to present herewith my report on the Summer Mining Schools, which were under your instructions held by me in Western Ontario during the past season.

The programme, which was outlined in Toronto, provided for a course of instruction

lasting for two weeks in each of the following places, viz.: Port Arthur, Wabigoon, Rat Portage and Mine Centre; while at each of the principal mines addresses were to be delivered to the miners, with the object of increasing their knowledge of local geology and mineralogy, and thus assisting them in their work.

The first class was held in Port Arthur, commencing on the 5th of May, and 12 students were enrolled. During

Port Arthur, Wabigoon, Rat Portage and Mine Centre.

the first week the attendance was good, but when the ice on the inland waters broke up on the 10th

of May nearly all the members were forced by their engagements to leave for the field, and in view of the small number who remained it did not seem advisable to continue the classes, so that the school was closed on the 11th of May. At the next station,

Wabigoon, the classes were started on the 25th of May and closed on the 7th of June, with a good general attendance.

Wabigoon, Rat Portage and Mine Centre.

The total number of students was 32. In Rat Portage the session

lasted from the 14th to the 29th of June, with 15 students enrolled, and in Mine Centre the last class for the season was held from the 20th of July to the 3rd of August, with a total of 20 students. The general attendance varied considerably, but whatever the size of the class a lively interest was shown in the work which was being carried on. At each station some of the men attended regularly all the sessions, and these students made very substantial progress, becoming expert in the practical work and adding to their knowledge of the subjects discussed in the lectures. Others, who were less regular, also benefited by the instruction, and it is hoped laid the foundation for a more exact and thorough training.

At the close of the work in Port Arthur a trip was made to two of the old silver mines,

Visits of Instruction to the Mines.

the East and West End Silver Mountain, at which work had commenced once more. On the East

End property there were only 8 men and no stop was made, but at the West End 21 men were employed. Capt. Tonkin, who was in charge, informed me that nearly all were foreigners, to whom the English language was quite unfamiliar, so that no address was delivered.

From Rat Portage, in company with Mr. J. A. Bow, Inspector of Mines, a series of visits was made to the working mines on Lake of the Woods. At the Mikado a large number of men were employed, and a lecture on the local geology of the district, with a short account of the chief minerals occurring in it, was delivered to an audience consisting of almost the entire force. The Cornucopia, Ontario Limited, and Yum-Yum mines were

lying idle, and at Cameron Island mine the number of men was so small that only a short visit of inspection was paid.

No underground work was being carried on at the Regina, although a number of men were engaged in building the new mill and setting up the machinery; but as these were carpenters and engineers, who would not be interested in the subjects under consideration, it was not thought advisable to deliver any lectures. At the Stella all the miners were away in town for a holiday, and the next visit was to the Sultana. Here Mr. Hunter, the manager, informed me that almost all the miners were Swedes, with a very limited knowledge of English, and on that account no addresses were given there.

In the Seine River district no work was going on at the Foley, Lucky Coon, Ferguson or AD2, but a large force was employed at the Golden Star, and a lecture was delivered one afternoon to all who cared to attend. The audience was large, and an address similar to that given at the Mikado was listened to with appreciable interest. At the Emperor mine another lecture was delivered, which was also well attended and well received.

The attendance at the classes is of course influenced largely by the state of the mining industry, and this was noticeable during the past summer. In 1897 there was abroad a feeling of excitement over the mineral resources of the country, and many persons were anxious to become to some extent familiar with mineralogy and geology. In addition, the number of prospectors was large, so that from these two sources very good classes could be formed. In the summer of 1898 a reaction had set in, and although much steady and useful work was being carried on the excitement had very largely subsided and the attendance at the schools fell off in consequence. If report be true, the number of prospectors in the field during last summer had diminished to one-third of what it had been in the previous year, while many who had been exploring in 1897 were hard at work developing and preparing their properties for sale.

The course of instruction was intended to

be as helpful and interesting to prospectors and miners as possible, and on that account

the more scientific side of the work was entirely omitted. In illustration, it may not be out of place to give the following syllabus of the course:

In geology, the changes that are now taking place at the surface of the earth were

described at some length, and it was pointed out that a careful study

of the present conditions was the key in a great measure to the records of past action as they have been preserved in the rocks. From this standpoint the formation and significance of different rocks were described and the means of determining their age were discussed, while the importance of these tests in identifying in new districts those rocks which had been proven metalliferous in older and better known regions was pointed out. In dynamical geology, the folding of rocks and the production of faults and fissures, with their significance, were treated in detail, while the action of volcanoes, important as that has been in western Ontario, was described somewhat thoroughly. When the elementary work had received attention, the local geology was developed, and the relations of the rocks in the vicinity were described. As might be expected, this particular branch of the work attracted more attention than any of the others, and I was assured upon several occasions that the field work could afterwards be prosecuted with much clearer ideas as to the relations of the different rocks, an end which was well worthy of the time spent in reaching it.

Since a prospector spends the greater part of his time among the rocks, the subject of

lithology received careful attention.

In the lectures the origin and mineralogical composition of rocks were described, and afterwards field determination was practised upon specimens gathered from the immediate vicinity as far as possible.

In mineralogy, the value of the physical properties, color, streak, hardness, etc., for

the rapid determination of minerals

was demonstrated by practice with specimens, and lectures were given describing the common minerals of the country, with

Attendance
at the
Classes.

Lithology.

Mineralogy.

their economic value and identification. Each student was supplied with blowpipe, forceps, platinum wire, etc., and was taught to use them for the determination of minerals. After a fair degree of proficiency had been attained, minerals unknown to the student were given for examination, and were in most cases named correctly.

The field assays for gold and silver ores by which the values may be ascertained in the field with simple apparatus were shown in practice, and a number of samples belonging to members of the classes were tested in this manner.

The mineral collections which had been provided by the Bureau of Mines at Port Arthur and Rat Portage were of great service, and enabled the students to become familiar with more minerals than could be carried about in a travelling collection. Any person who is interested has access at all times to the collections to study the specimens, or compare them with others which he is anxious to determine. The benefits thus conferred will be apparent to everyone, and it is undoubtedly a step which is in the best interests of the mining industry.

For great courtesy in providing accommodation I have to thank Mr. D. F. Burke of Port Arthur, the town of Wabigoon, the town council of Rat Portage, and L. Hamel & Co. of Mine Centre; and my acknowledgments are also due to many gentlemen who assisted me in various ways. J. W. B.

Dr. Goodwin's Report.

I beg to submit the following report of mining classes conducted during June and July by myself and Professor Nicol:

The places selected for holding the classes were Parry Sound and Mattawa. I left Kingston on June 14th and went to Ottawa to take the Ottawa and Parry Sound Railway for the west. On the way from Ottawa to Parry Sound I took two days to go west to Mattawa and arrange for a class there. The mayor and council of Mattawa received the suggestion favorably, and it was decided to begin work there early in July.

Proceeding to Parry Sound, I was there joined by Professor Nicol. We were given

the fire hall in which to hold classes, and tables and seats were provided by the town council. Considerable prospecting is being done in the neighborhood of Parry Sound, and discoveries of iron and copper ore have been made. Garnets are very abundant, and might be mined as an abrasive. The prospectors were eager for instruction in mineralogy and geology, and some came from long distances to attend the class. The total number of students who attended the class was fifty-two, and the average daily attendance was about twenty—very good considering the long distances and the difficulty of arranging a time table to suit the circumstances of all. The classes opened on June 20th and closed on July 2nd. A number of prospects and test pits were visited at the request of owners and others interested. Bornite, chalcocite and chalcopyrite are often found, but so far not in paying quantities. At the Wilcox prospect zincblende and pyrrhotite were noticed in considerable quantities; also a little molybdenite. Those students of the class who were able to accompany us on these excursions had the advantage of examining the minerals and rocks in situ. Two classes were held each day, one at 9 a.m. and one at 6.30 p.m., each class lasting for about two hours. The greater part of the time was spent in the examination of mineral specimens from our collection, as well as large numbers brought in by members of the class, some of whom became quite expert in identifying minerals by the aid of a simple table printed especially for the work of these classes.

We left Parry Sound on July 2nd and distributed corundum specimens at Kearney, Rainy Lake, Canoe Lake, Cache Lake, Whitney, Barry's Bay and Killaloe, points on the line of the Ottawa and Arnprior Railway. Reaching Mattawa on July 3rd we began classes there the next day. The council had provided excellent accommodation in the town hall, and the success of the classes there, as in Parry Sound, was due largely to the energetic manner in which the subject was taken up by the mayor and council, and by citizens interested in minerals and mining. The opening of the

classes had been well advertised, and they were begun with a large number in attendance. The total number who did systematic work was 73, and the average attendance was about 45. Two classes were held each day, one from 9 a.m. to 11.30 a.m., and a second from 6 p.m. until dark. The students brought in large numbers of specimens for examination, and many specimens were determined at odd times, as those who had them were met during the day. In addition to those counted as students, there were many visitors who came in to examine the mineral and rock specimens and to ask for information. Several experienced prospectors have been at work up the Ottawa and around lake Temiscamingue. The Huronian areas there are receiving attention. Good specimens of magnetite and limonite, said to have been obtained within a few miles of Mattawa, were brought in by members of the class. The instruction was confined mostly to identification of minerals and rocks and to elementary geology; but some time was given to methods of sampling and to the relations of geology to prospecting. Many members of the class identified upwards of 50 specimens of minerals and rocks. The classes closed on July 11th.

There can be no doubt that these outside mining classes are serving at least two purposes—first, to call attention to Practical results. minerals in general and to valuable minerals in particular; and secondly, to give professional and occasional prospectors correct ideas as to how to find out the value of a discovery. The prospector has often a very limited knowledge of minerals, and may miss valuable discoveries which even a small extension of his acquaintance with mineral species would enable him to make. He also has sometimes quite incorrect ideas about sampling for assay. For this reason it is well to give special attention to this subject. We also found it useful to carry an assay outfit with us, not for the purpose of teaching assaying, but to illustrate the nature of the process of assaying for gold and silver. This serves to warn prospectors against incompetent assayers.

Thanks are due to the many citizens of Parry Sound and Mattawa who assisted to make our work pleasant, and to the Canada Atlantic and Canadian Pacific Railways which gave free transportation for our heavy luggage.

W. L. G.

PROVINCIAL ASSAY OFFICE

By J. Walter Wells

I HAVE the honor to present the first annual report of the Provincial Assay Office, which was opened for public assay and analytical work on July 3, 1898. The report includes the operations of the office up to December 31, 1898.

The Record for Six Months.

Instructions were given me by the Director of the Bureau of Mines on May 29 to proceed to Belleville and attend a meeting of the City Council when the agreement between the Bureau and the Council was made. The latter leased the present quarters of the Laboratory for a period of one year at a rental of \$200 free from taxes. Three days were spent in Montreal personally selecting apparatus and supplies. The occupant of the two rooms in the Falkener block provided by the Council moved out on June 10, and July 3 the laboratory work was started, the intervening time being spent in cleaning the rooms, setting up furnaces and apparatus and directing the plumbing and carpentry work.

Advertisements were inserted in the local newspapers and the following circular was sent out to the Crown Lands agents and to the various mining and prospecting centres :

PROVINCIAL ASSAY OFFICE.

The Assay Office and Laboratory equipped at Belleville under direction of the Bureau of Mines is prepared to assay and analyze ores at the following rates :

Assay in duplicate for	1 sample.	3 to 5 samples at one time, each.	6 or more samples at one time, each.
Gold	\$1 00	\$0 90	\$0 75
Silver	1 00	0 90	0 75
Gold and Silver	1 25	1 00	0 90
Copper	1 25	1 00	0 90
Arsenic	1 25	1 00	0 90
Nickel	3 00	2 40	2 00
Lead	1 25	1 00	0 90
Iron Ores.			
Metallic Iron	0 50	0 40	0 35
Silica	0 75	0 60	0 45
Sulphur	1 00	0 90	0 75
Phosphorus	1 50	1 20	0 90
Titanium	1 50	1 20	0 90
Manganese	2 50	2 00	1 80
Corundum			
Alumina	2 00	1 80	1 50
Silica	0 75	0 60	0 45
Iron	0 50	0 40	0 35

Analyses of Limestones, Marls, Clays, Peat and Economic Minerals at corresponding rates.

Gold ores tested as to free-milling qualities by Amalgamation Assay.

DIRECTIONS for proper Selection of Sample : If the commercial value of a deposit is desired, an average sample for assay may be taken thus : Detach a small piece ($\frac{1}{4}$ to $\frac{1}{2}$ lb.) every 10 or 12 inches across the whole width of the deposit. Repeat this operation every 8 or 10 yards, going the whole length of the deposit. The total amount of ore collected represents an average sample. If the deposit is opened up, samples from each shaft and level taken in a similar way must be included with surface samples. Amount of ore for average sample, 5 to 40 lb. Deposits of variable character (e.g. gold ores) require more than those of uniform character (e.g. iron ores.)

DIRECTIONS for Quartering Down—Large quantities of ore for assaying may be reduced by "quartering down" thus : Crush the whole amount to size of a walnut make into a round heap, mix thoroughly and divide into four equal parts. Select one quarter, crush to size of a bean, mix thoroughly and quarter as before. Proceed in the same manner until the quantity is reduced to 1 or 2 lb. weight.

DIRECTIONS for sending Samples to be Assayed—Crushed samples representing the average of large quantities, or samples less than 5 lb. in weight, may be sent by mail as 5th class matter (1c. per oz., limit weight 5 lb.) or per parcel post (1c. per 4 oz., limit weight 24 oz.) Place in a canvas bag, tie securely, and address to the undersigned. Write your own name and address plainly on the tag and send instructions with money in payment of fees in a separate letter. When more than one sample is sent at one time, each sample must be distinctly marked or numbered, so that they may be identified by instructions in letter.

TERMS—Money in payment for assays and analyses must invariably accompany ore. Assays and analyses are confirmed in each case by a check or duplicate and guaranteed correct. The pulp of each sample is held for future reference.

J. WALTER WELLS, B. Sc.,

Assayer to the Bureau of Mines
Belleville, Ontario.

Shortly after the announcement of the opening of the Laboratory by the Bureau samples for assay were sent in from various points. The receipt of samples has steadily increased in number up to the time of writing. The first certificate was issued on July 5, and to 31 December 23 samples were received for assay or analysis. Of this number 41 were done for the Bureau of Mines, on which no fees were collected

The total number of assays made was 227, and the total number of analyses 116, being in all 343 tests or determinations on the 239 samples.

The fees charged by the office for assays and analyses are nominal. They are based on the cost of the materials—chemicals, fuel, etc.—used in each operation. The fees for gold, arsenic and iron ores are relatively lower than for others, as most of the prospecting and development work is done on these ores. As may be seen in the circular, a liberal discount is allowed on a number of samples sent in at one time. Up to 31 December the fees collected by the office aggregated \$241.30. The cash receipts were forwarded to the Bureau of Mines at the end of each month as follows :

July.....	\$17 25
August.....	30 75
September.....	57 25
October.....	66 30
November.....	36 15
December.....	43 60
Total.....	\$241 30

Some difficulty was experienced in collecting fees, and in several instances samples were treated and certificates not issued as no fees were received.

Numerous samples were received for identification. In each case a full description of the rock or mineral as determined by field tests was given, accompanied by information as to uses, market value, probable value of sample, etc. No fee is charged for this class of work, although in many cases it involves the getting of the mineral in solution and applying wet qualitative separation tests.¹ This work often saves an assay or analysis, and is greatly appreciated by the public. No record was kept of samples received and reported on in this way until November 6. From that date to the end of the year forty-five samples were reported on, either personally or by letter. In each case, when necessary, full information was given as to commercial uses, market value, etc.

Two trips were made to the back country to become better acquainted with the district.

¹ A scale of fees for this class of work has been adopted for 1899.

One of these was to Madoc and the surrounding country, where the various deposits were visited as far north as the Craig gold mine in Tudor township. The other was to the Coe Hill iron ore mines and the adjacent deposits of iron ore. Samples from each of the deposits visited were collected and placed on exhibit. I am often obliged to answer enquiries regarding the minerals in Eastern Ontario, and the most satisfactory method of obtaining reliable information is to visit the deposits personally.

Equipment of the Laboratory.

The Laboratory is at present located on the ground floor of two rooms. The equipment is adapted to the needs of a Laboratory prepared for assay work on gold, silver, copper, lead and nickel ores ; also for the quantitative analysis of common economic minerals and ores, such as those of iron, corundum, nickel, zinc, lead, peat and coal. The assay part of the Laboratory has a first-class modern equipment. For those assays requiring fluxing down or fusion a complete set of gas furnaces, consisting of roasting, crucible fusion, scarification and cupellation furnaces is used, together with a universal Hoskins' muffle furnace heated by gasoline under pressure. For testing gold ores as to free-milling qualities, a laboratory arrastra together with amalgamation pans is used with good results. Copper and nickel estimations are done by both fire and electrolytic methods, the metal in the ore being deposited in the latter method on platinum cylinders by an electric current from a set of gravity cells. In the fire assay the system of breaking crucibles, rather than pouring and using again, is employed. The ordinary requisites, such as pulp balances, ore scales, fluxes of various kinds, reducing agents etc. are in use.

The ore samples received for treatment are prepared by crushing in a small hand crusher and pulverized from 80 to 100 mesh in a mortar. With regard to the sampling down of large quantities of ore sent in for treatment, the commonly approved methods are adopted. All assays and analyses are done

in duplicate, the results being checked off so that errors can be reduced to a minimum. This method can not be adopted however unless a sufficiently large quantity of ore is received. The samples are in each case, both the rough and the pulp, retained for future reference. The Laboratory is prepared to send out the returns on samples received for gold, silver and copper assays the same day that the samples are delivered providing there is no rush. Under present circumstances the Laboratory cannot handle more than a limited number of samples for gold and silver assay in duplicate per day. A fine Becker assay bead balance in use allows the weighing of gold residues down to 20c. per ton in gold.

The analytical part of the Laboratory is not altogether satisfactory as regards location and equipment. Since expenditure of capital often depends on the results of an analysis of ores, a first-class equipment in proper quarters is a necessity. In fitting up the Laboratory it was not expected that many samples for quantitative analysis would be received at first, but the record for the past six months shows considerable work done in this line and justifies the fitting up of this part of the Laboratory in a more elaborate manner. At present analyses of ores are done in the front room, which is also used as an office and contains three cabinets for the exhibit of mineral specimens. The public has free access to this room, which in some measure interferes with careful analytical work.

As regards methods used, it may be said that none but the well-tried ones are pursued. The ores are prepared by crushing, pulverizing and in most cases reducing to an impalpable powder in agate mortars before treatment with acids or fluxes necessary in making the ore pass into solution. For the latter process, a fume cupboard having burners, baths, etc. is used. This is connected with the outside air by a horizontal galvanized iron pipe, at the end of which is an exhaust fan run by a 2-inch water motor drawing the fumes to the outside air. This is not satisfactory, as a fume cupboard properly constructed should have a strong direct

vertical current of air, preferably that of a large chimney flue. There are three working tables. One is for volumetric estimations of iron, zinc, etc. supplied with standardized solutions. Another is for general purposes, being supplied with water taps, sink, filter pump, steam bath connected to exhaust fan, shelves for solutions and cupboards underneath for various apparatus. The third is for ignition of precipitates and fusion of ores, being supplied with a bath, platinum crucibles, blast lamp, etc. Distilled water, used almost exclusively, is secured by an automatic Jewell still heated by gas. A Becker analytical balance reading to one-tenth milligram is used in weighing precipitates. The pulp balance, assay bead balance and analytical balance, each with a set of weights, are at present placed in a vault at the back of the suite of rooms. This is very damp in winter, but is otherwise satisfactory. The following forms of certificates are used in sending out reports on samples. They seem to answer the purpose fairly well, being convenient to carry in the pocket and for reference.

Forms of
Certificates.

No. Made for Date
Sample Marked
Assayed in Duplicate for
Laboratory of the Assayer to the Bureau of Mines, Belleville, Ontario. J. WALTER WELLS, B. Sc., Official Assayer.

No.	Gold. oz. per ton.	Value per ton of ore.	Silver. oz. per ton.	Value per ton of ore.

Assayer.

No. Date Sample Marked
Analyzed in Duplicate for
Laboratory of the Assayer to the Bureau of Mines, Belleville, Ontario. J. WALTER WELLS, B. Sc., Official Assayer.

No.	Metallic Iron. per cent.	Silica. per cent.	Sulphur. per cent.	Phosphorus. per cent.

Analyses made for..... Chemist.

State Assay Offices Elsewhere.

Several of the mining States of America, notably Colorado, have at some period in their history maintained State assay offices.

The general practice has been to maintain such an office for a more or less indefinite time during the prospecting and developing stages of the mineral industry. This has been done by the State Governments as a direct aid in stimulating the industry. In almost every instance the action has been received with favor by the prospectors, mineral property holders and mining men in general who require the assaying and analyses of ores. Where the mining industry is best developed, the State aid seems to be the least, the necessary assay or analytical work being done more by commercial laboratories in proximity to the mining centres. States having a Bureau of Mines as a sub-department of the Government invariably maintain an assay laboratory in connection with the department, which in several instances are located in the mining districts.

Many of the States maintain a Geological Survey staff in connection with the State University or School of Mines, and all of these institutions have testing laboratories—assay, analytical and metallurgical—some with elaborate and expensive equipments. The State of Colorado, the principal mining State in the Union, has for many years conducted a State assay office and a Mining Bureau at Denver, where the economic minerals of that district have been elaborately advertised by means of exhibits, lectures, literature, etc. A considerable amount of money seems to have been spent by the State in this way. The results have amply justified the outlay, as Colorado has steadily advanced as regards production of metals, such as gold, silver and lead.

The Province of British Columbia has maintained a Government assay office for the past twenty years. There seems to be no doubt that it has proved a stimulant to the mineral industry in that Province by giving to prospectors and mining men reliable returns upon which they might invite or safely invest capital. The British Columbia Assay Office is at present located in a building constructed for the purpose, and the equipment is to be elaborate.

There seems to be a movement on foot at

present in that Province to prevent the Government Laboratory from entering into competition with private laboratories. The proposal does not seek to abolish the office entirely, but to limit its function to that of acting as an umpire assayer; that is, in case of dispute between parties handling ore the certificate issued by the Government Laboratory on the value of the ore in question is to be accepted as final. It is suggested by the petitioners to the Government in regard to this matter that the fees charged for the latter work should be double the ordinary commercial rates, thus compensating for the limited function of the Laboratory.

In Hamburg, Germany, there is a Government assay office which has been operating since 1895 with remarkable success.

With regard to the fees charged for assays and analyses, various practices seem to be followed. The Government assay office of British Columbia charges the usual rates, and a comparison of the fees as copied from the list of official charges with the fees charged by the Ontario Laboratory may be of interest.

Minerals.	B. C. office.	Ontario office.
Gold and Silver.	\$1 50	\$1 25
Gold, Silver, Copper together	3 00	2 50
Copper	2 00	1 25
Lead	1 50	1 25
Iron	3 00	9 50
Nickel, quantitative assay.	10 00	3 00
Zinc	5 00	2 00

The quantitative analysis of ore in British Columbia is \$25 to \$50 according to constituents, while in Ontario it is \$5 to \$10.

Some of the States in the United States have followed the practice of doing the work for the public free of charge, lodging discretionary powers with the assayer as to what samples are worth testing. Other States, on the contrary, have charged nominal fees to prevent the testing of worthless samples which might otherwise be sent in for examination.

In Ontario as in other countries a great deal of unreliable assay and analytical work has been done which has encouraged in some cases the outlay of capital without reason. Work done by the Government tends to pre-

vent this, and the results are guaranteed so far as the samples are concerned. A number of such unreliable reports, more especially in gold and silver assays, have come under my observation during the last year and it has been shown that those who have paid for such assays have been simply humbugged.

State of the Mineral Industry in Eastern Ontario.

The outlook for the mineral industry in eastern Ontario is encouraging, as there seems to be no doubt as to the existence of workable deposits of various economic minerals. More capital is being spent at present in actual development than ever before in the history of the district, and the mines treating ore are getting good results. The ores showing the most activity are those of gold, iron, arsenic and lead.

As for gold, three mines are raising ore for treatment. At the Belmont mine, owned and worked by the Cordova Exploration Co., of London, England, a low-grade quartz carrying a small percentage of sulphurets is successfully treated by a well-managed ten-stamp mill made by the W. B. Hamilton Co. of Peterboro. At the Deloro mine, near Marmora, owned by the Canadian Gold Fields Syndicate Co., of London, England, an arsenical ore is treated by a modern Fraser and Chalmers ten-stamp mill, the concentrates being treated by the Sulman bromo-cyanide bleaching process with excellent results. At the Boerth mine, near Ardoch, a Detroit company is working a free milling quartz, apparently high grade, which will shortly be treated by amalgamation. Several other properties are being developed with every promise of becoming mines, notably the Diamond at Queensboro, an arsenical ore body carrying high values in gold.

As for white arsenic, small quantities of fair quality have been made in trial furnaces at the Toronto Smelting Co.'s smelting works at Madoc; also by Mr. Joseph James at Actinolite. This product found a ready sale in the New York markets at a fair price. There seems to be no reason why capital should not find a safe investment in the manufacture of white

arsenic and its products, as fuel, labor, and high grade arsenical ore can be got cheaply in North Hastings. White arsenic is rising in value owing to apparently diminishing ore supplies in Germany and England, which now control the market, combined with increasing uses of the article and the various products made from it in the arts. White arsenic is quoted in the New York markets at an average price of \$80 per ton. The process of extracting it from the North Hastings arsenical ores is comparatively simple and should yield a fair profit on money invested.

Iron ores (hematite) have been shipped steadily from two deposits near Madoc, and from Calabogie station on the K. and P. Railway to the Hamilton blast furnace. A magnetic iron ore has also been worked near Malone on the C. O. R.; also at Bedford on the K. and P. Railway. The Deseronto Iron Co., making charcoal pig iron, is also in the market for Ontario iron ores of Bessemer quality.

The large number of iron ores received for analyses at this Laboratory indicates a considerable activity in this district. Judging from the samples analyzed and from personal inspection, there seems to be numerous deposits of magnetite of more or less extent which may be classed as lean ores. Some of these can no doubt be made into Bessemer grade by magnetic concentration. Similar deposits of lean magnetic iron ores are being successfully worked in New Jersey and the Southern States by a system of magnetic concentration. Much of the Swedish charcoal iron which commands such a high price in the markets is made from more or less low grade magnetic iron ores. With an active demand for iron ores in Ontario, there seems to be no reason why these low grade ores cannot be placed on the market at a profit.

Lead ore (galena) is being shipped to Belgium from a deposit near Bannockburn, Hastings county. It is reported that a lead smelter is to be erected at Madoc.

A few shipments of felspar from Bird's Creek, in Hastings, have been sent to the English potteries, which pay about \$8 per ton delivered at Liverpool. There are several

large bodies of almost pure orthoclase felspar in this county, which are probably of commercial value as fluxes in the manufacture of pottery ware of various grades.

The corundum deposits in North Hastings and Renfrew show no active development as yet, but a few good properties owned by private parties have changed hands.

The limestone quarries at Crookston station and at Point Ann, near Belleville, have been worked steadily for the past six months with a large staff of men at both quarries. The Inspector's report will no doubt give a description of the operations.

A small shipment of sodalite from the nepheline syenite areas in Dungannon township was made to a Philadelphia jewellery firm, to be made up into ornaments.

Future of the Assay Office.

The Laboratory needs more room so that the analytical part may be put in a more satisfactory condition. A separate room is also needed for the display of mineral samples which are sent in to be placed on exhibit to such an extent that it is becoming impossible to make room for them under present conditions. As under the agreement with the Bureau of Mines the Council is to provide suitable quarters for the use of the office, it is earnestly advised that as soon as possible the Laboratory be given the use of a building with the requisite amount of room suitable to the present needs of the office.² No attempt has been made

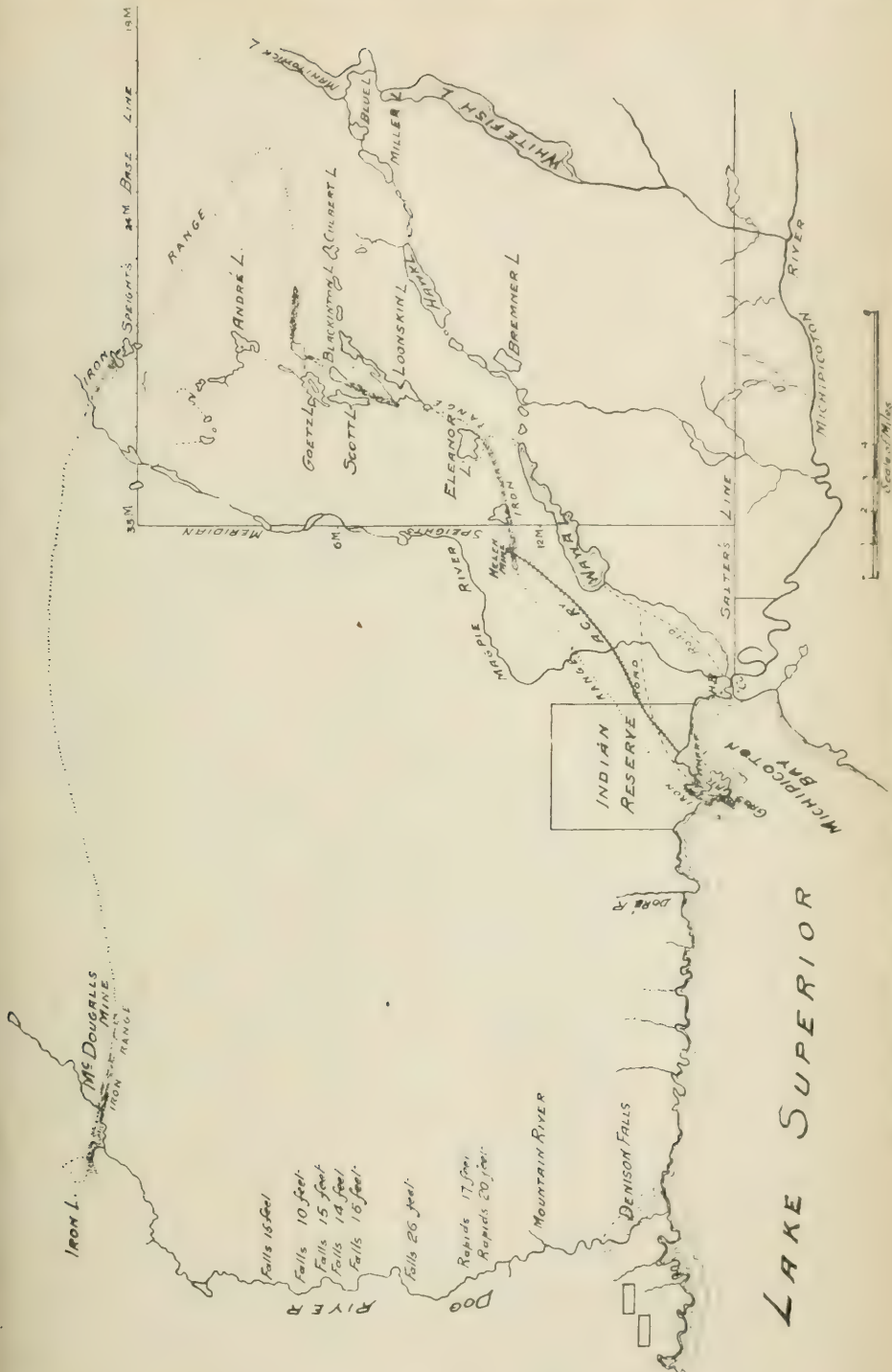
² Suitable quarters in another building have been provided by the Council during the present year (1899), and the office is now well housed.

to make a systematic collection of the ores and minerals of this district, as my instructions are to attend to Laboratory work for the present.

It is the desire of many business men in Belleville and the mining district in North Hastings that a Bureau of Information be maintained in connection with the Laboratory for an exhibition of the economic minerals of eastern Ontario as well as assisting in every way possible to advertise the district, so that legitimate capital may be induced to operate. Such a function will no doubt fill a public need in this district, but it will require an addition to the office staff. Taking the action of the State of Colorado as an example with regard to this matter, the scheme properly carried out would probably meet with considerable success.

As may be seen by the record of work done by the Laboratory for the past six months, the location of the office seems to be central and convenient to the mining public. Belleville has good communications with all parts of eastern Ontario.

The letter book shows that 287 letters were sent out exclusive of certificates, circulars and reports on specimens for identification. For the first two months a large number of circulars were sent out by mail to the various centres and to mining men. The letter file shows that 190 letters were received at the office. For the first two months a large number of visitors called at the office, more through curiosity than on business. This was a considerable hindrance to the Laboratory work, but my instructions are to receive all visitors with courtesy.



Map of the Michigan Iron Region By A. P. Coleman and A. B. Willmott, 1899. Scale 1 mile to an inch. pp. 24-55

Bad Vermilion Lake



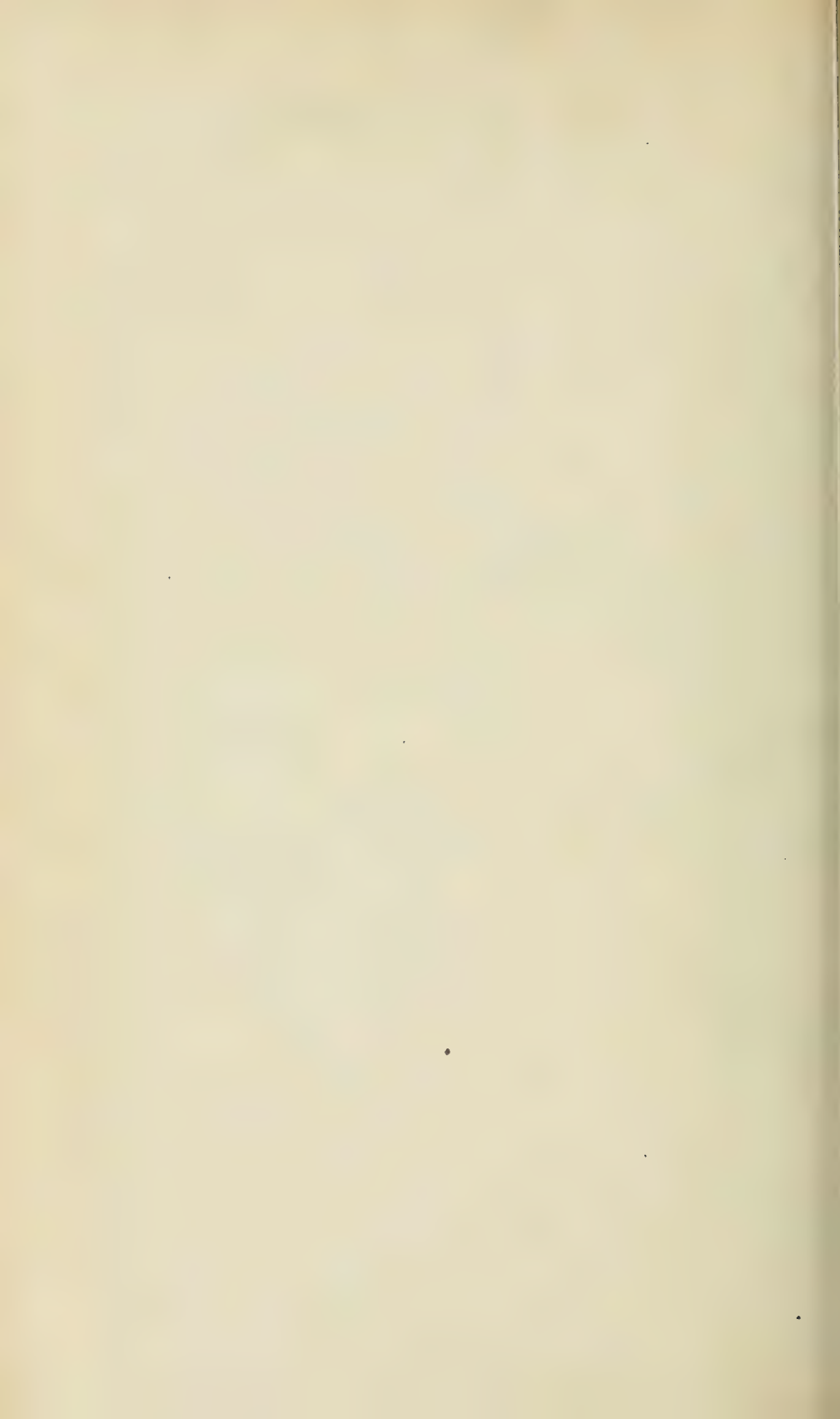
Plan of Golden Star, JO41

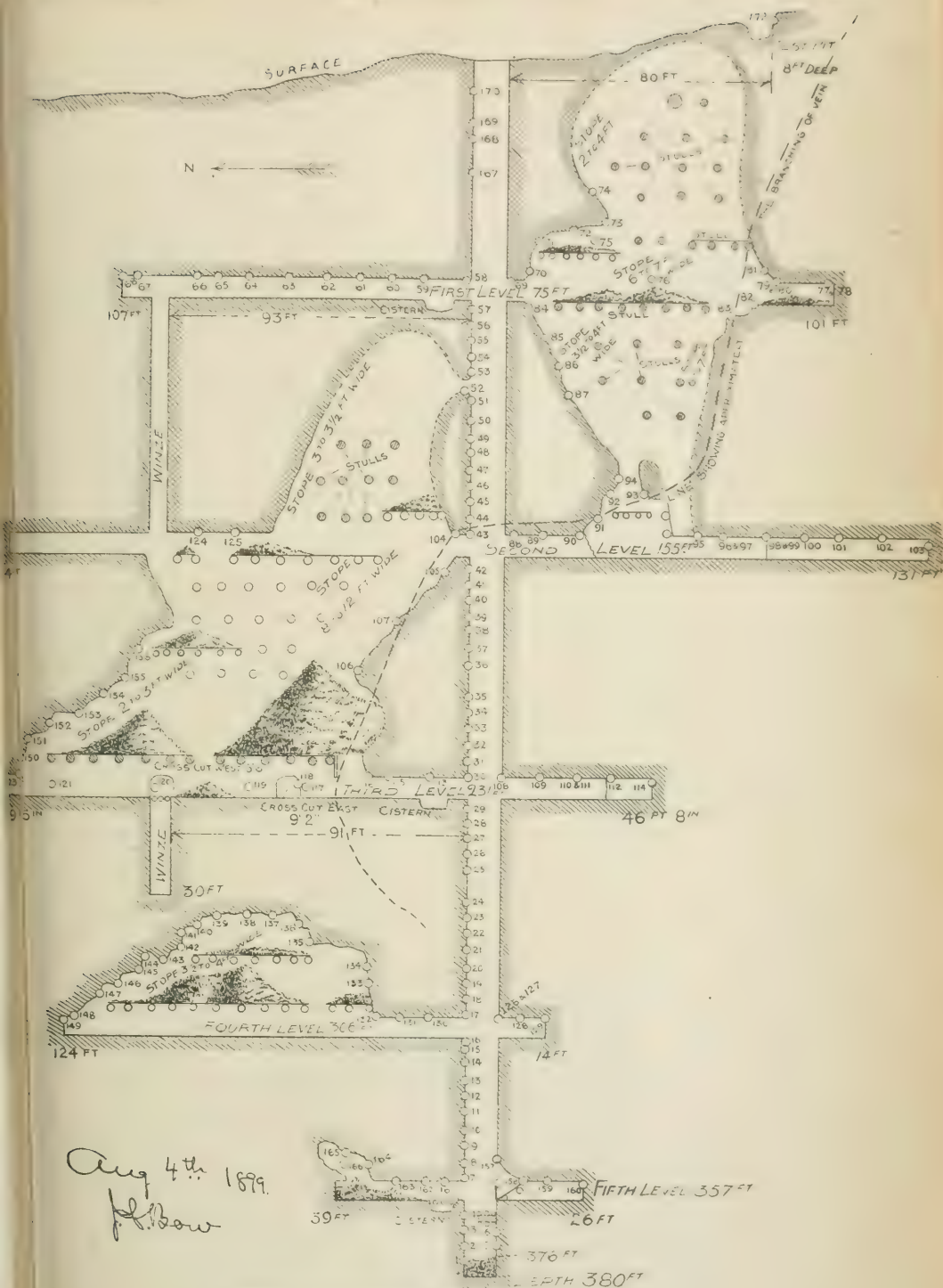
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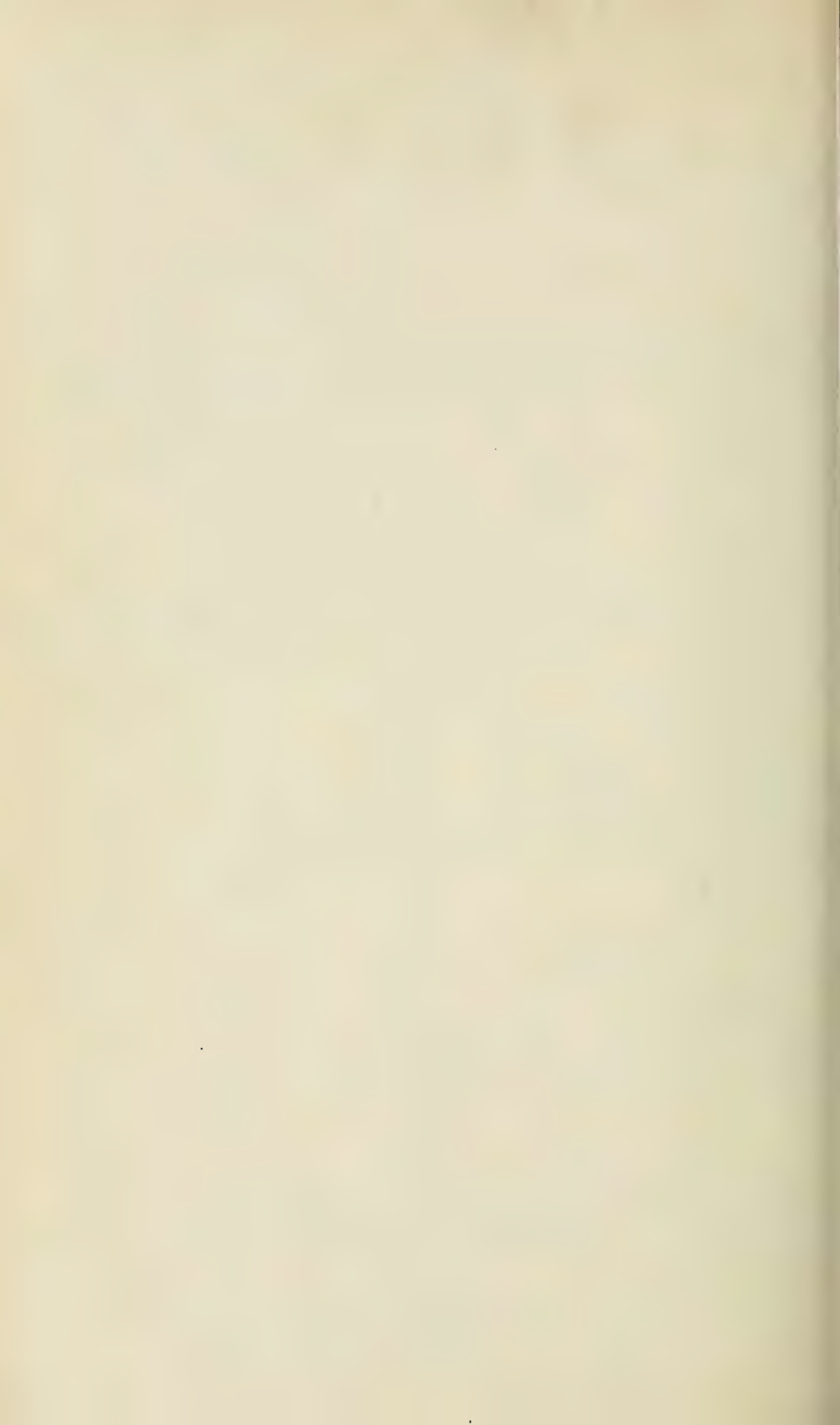
J. Row

See pp 264-271.





Longitudinal section of the Golden S. A. Mine, pp. 204-271



SEVENTEENTH ANNUAL REPORT

OF THE

PROVINCIAL BOARD OF HEALTH OF ONTARIO

BEING FOR THE YEAR

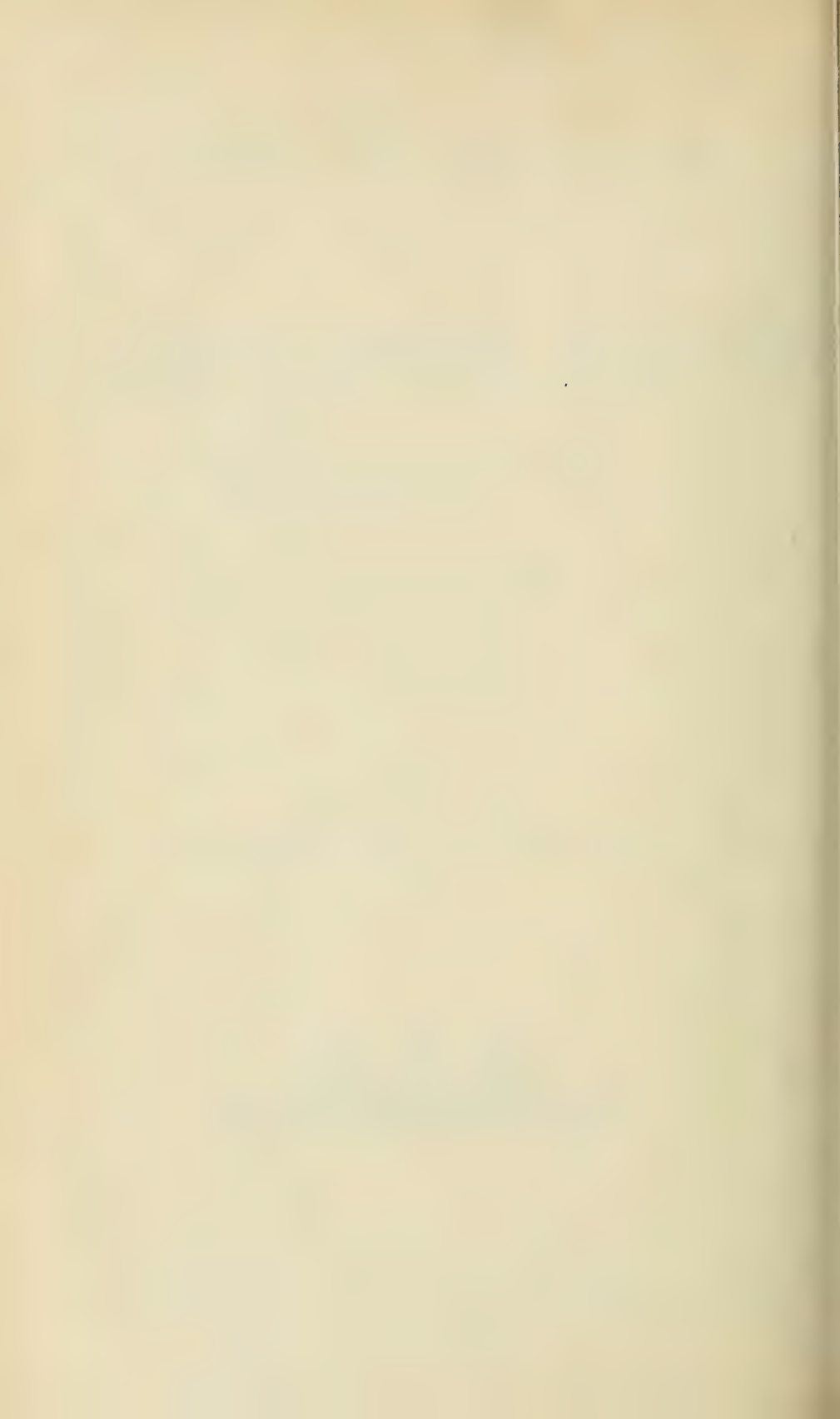
1898.

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY.



TORONTO:

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1899.



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SEVENTEENTH ANNUAL REPORT

OF THE

PROVINCIAL BOARD OF HEALTH.

INTRODUCTION.

To His Honour the Honourable SIR OLIVER MOWAT, K. G. M. G., Lieutenant-Governor of Ontario.

MAY IT PLEASE YOUR HONOUR :

The Provincial Board of Health, in presenting this its seventeenth annual report, has pleasure in again adverting to the conditions of the public health throughout the past year, as having been favorable, no epidemic has to any extent prevailed, so as to cause general suffering, although complaints have reached the Board that certain lighter infectious troubles were found to exist among the children on the assembling of the schools after the autumn vacations. The Board took steps to inquire into these. The duties of the Board have through the year consisted very much in seeing to the water supply of various localities, and investigating complaints regarding the pollution of streams. The complainants were on one occasion the farmers living on the banks of a small river which before reaching their farms received the sewage of a town of some consideration. It was found difficult to effect a *modus vivendi* between the disputants, and the dairy interests of the neighbourhood possibly still suffer, more than need be, from the mingling in their streams of the impurities of the town. The Board has to regret that in this as in other instances it has found interests which were only seemingly conflicting very difficult to reconcile. Although no epidemic has prevailed, yet one disease of that nature, "smallpox," has appeared in several quarters, introduced first from without the Province, showing its usual disposition to spread in whatever quarter it appeared. The active interference of the Secretary of the Board, who visited many of the localities where the disease was reported to be, causing due measures to be taken for the isolation of infected persons, prevented the prevalence of the disease from including much territory. In connection with smallpox, it seems right to report there is at present a greater risk of its attaining prevalence wherever it gets introduced by reason of an increasing neglect of, and on the part of not a few, even a strong objection to, vaccination. It is to be hoped that public opinion will not permit itself to be further led astray by the fanciful views of certain theorists on this subject, who hold that it is wrong "to provide against the breaking out of one disease by the

infliction of another." There are not wanting, among those who have not attained an old age among us, some who in their European homes have seen the great numbers of scarred and disfigured faces, and the many blind, who have lived and suffered from smallpox before Jenner's great discovery of the results of vaccination became known.

The Board in carrying out its work has still to note as prevailing a comparative indifference with regard to sanitation. That is to say there is not the same appreciation of the value of health laws that is everywhere displayed towards those which care for wealth, and it may be some time before as perfect an organization shall exist because of the one, as exists for the other; but the "Board" looks forward with hope to the time when the value of life and health shall be as highly appreciated as is that of property, and when as competent and as well remunerated officials shall superintend the conditions which appertain to them.

In this introduction to Your Honour of the Report of the Board for the past year, it is not out of place to make especial reference to consumption. More is known of this disease than in former times, but its prevalence continues. It cuts off a greater number of lives than all other infectious diseases combined. The Board has been doing what lies in its power to lessen the incidence of its infection by placing it in the list of notifiable diseases; but if there be any course with regard to it which may in some instances be a practicable preventive, it would seem to be the establishment in fitting localities of hospitals or "homes" whither such as give indications of being affected may betake themselves at a period of the disease early enough for themselves to benefit, as well as for their friends and neighbours to be safe from infection by them.

Respectfully submitted,

J. D. MACDONALD,

Chairman.

ANNUAL REPORT

OF THE

PROVINCIAL BOARD OF HEALTH OF ONTARIO.

PART I.

CHAPTER I.

REPORT OF THE SECRETARY.

With December of 1898 there ended the first complete year in which, under the Consolidated Act relating to Births, Marriages and Deaths, passed in 1896, monthly reports of all deaths from contagious diseases are returned to the Registrar-General by the 777 Division Registrars of Ontario, and through which returns the Provincial Board of Health is enabled to accurately and promptly estimate the prevalence throughout the Province of those contagious diseases notifiable under the Public Health Act, since the Secretary of the Board is likewise Deputy Registrar-General.

The monthly reports published during the year 1898 represented returns from an average population of 1,840,000 and of 626 registration divisions; or 80 per cent. of the population was reported upon, and 84 per cent. of the municipal registration divisions.

The following table shows the total deaths from the several diseases reported upon in 1898, as compared with those for the whole Province for the year 1897, taken from the Registrar-General's report of that year:

Table showing the Deaths in Ontario in 1897 and for the Population reported upon by Monthly Returns in 1898.

Year.	Disease.						Totals.
	Smallpox.	Scarlatina.	Diphtheria.	Measles.	Whooping-cough.	Typhoid.	
1897.....		169	976	80	163	355	4,897
1898.....		174	387	84	102	579	2,835

* The monthly returns for 1898 include only deaths from pulmonary tuberculosis or consumption and not other tubercular diseases as of infants and children.

The returns must be looked upon, so far as the more acute contagious diseases are concerned, as representing a high standard of health, both relatively and absolutely, and the Provincial Board of Health as well as the Province has just cause for pleasure that these results are closely associated with its efforts for the improvement of the public health.

Smallpox. The year has been marked, like the two preceding it, by an absence of deaths from this cause; which absence is all the more remarkable in view of the widespread existence of outbreaks of the disease in various states of the American continent. The later months of the year have, however, seen the introduction of the disease into several municipalities which have been succeeded by outbreaks in others in the opening months of 1899. The following table gives the several outbreaks to the end of February, 1899:

Table showing Smallpox Cases in Ontario in 1898 and 1899 to end of February.

County.	Municipality.	Date of outbreak.	Source.	Cases.				Remarks.			
				Total.	Still sick.	Died.	Recovered.	Houses infected.	Houses at present infected.	Isolated in hospital.	Isolated in private houses.
Kent	Camden Tp	Oct. 15.	Detroit	4			4	1			4
"	Chatham City.	Sept. 30.	"	1			1	1			1
North-umberland	Cobourg	Oct. 25	Rochester	1			1			1	
York	Toronto	Dec. 3.	"	1			1	1		1	
"	"	Dec. 4.	"	1			1	1		1	
"	"	Dec. 28.	"	1			1	1		1	
Grenville	Wolford	Jan. 22.	Unknown	5	3	2		1	1		3
Prescott	E. Hawkesbury.	Jan. 27.	Soulanges, Q.	10	8	2		6	6		8
"	W. Hawkesbury	Feb. 3.	"	5	3	2		1	1		4
Stormont	Osnabruck	Feb. 3.	"	10	7	3		1	1		7
"	Cornwall Tn	Feb. 4.	"	1	1					1	
Dundas	Williamsburg Tp	Feb. 11.	"	4	4			1	1		1
Essex	N. Colchester Tp	Jan. 1.	Detroit	1			1	1			1
"	Windsor City.	Mar. 1.	"	1	1			1		1	

These repeated appearances of this disease in the Province, it being present in four counties at the time of writing this report, would seem to call for some remarks regarding a disease which in recent years has been the cause of so slight anxiety to the people of Ontario. That it has proved during the past few weeks to still possess all those fatal qualities which have marked its course during the thousands of years since Hindoo Brahmins practised inoculation against its ravages, is seen in the mortality caused by it in three of the outbreaks referred to; and that its contagiousness continues to be of the same intense character has been fully illustrated in the history of the Prescott and Stormont cases.

Comparative prevalence of smallpox in Ontario. Such being the case, it will be of interest to illustrate, by comparative tables showing the notable decrease in deaths from the disease during the past twenty years, the influence of those methods which have been adopted for suppressing outbreaks of contagious disease. The following table shows the deaths from it in Ontario since the first annual report of the Registrar-General was published in 1869. Remembering that the early reports were defective, and that since the organization of the Provincial Board of Health in 1882, accurate information of every outbreak of smallpox has existed, it may be presumed that a notably larger number of deaths actually occurred prior to that period than is represented by the figures.

Table showing deaths from smallpox, 1869-1898, in ten year periods.

Year.	Deaths.	Year.	Deaths.	Year.	Deaths.
1869	4	1879	195	1889	13
1870	2	1880	143	1890	none
1871	38	1881	5	1891	none
1872	187	1882	15	1892	none
1873	72	1883	4	1893	none
1874	112	1884	63	1894	5
1875	not reported	1885	30	1895	none
1876	31	1886	19	1896	none
1877	45	1887	none	1897	none
1878	36	1888	3	1898	none
Total	527	Total	477	Total	18

The above figures and those in the diagram on a succeeding page illustrate graphically the percentage prevalence of this disease, from which may be gained some idea both of the lives saved to the state and the saving to municipalities in combatting the spread of the disease.

Table showing deaths from smallpox in the different counties of Ontario, 1869-1898.

	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	Total.
Algonquin												3									1	3						7
Antigonish	3	2				3		8																				16
Arnprior	10									1					1													12
Brimley	33	3	13				1	127	97	2			1	11	12													300
Chapin						1												12										
Clinton	23	1			1	14	1	2		1	9							1						2				16
Coast	5				4																		2					55
Denison	2		1		1								1															9
Elgin	1	3																										5
Essex	6		2																									4
Haliburton																												8
Hastings			2					11	3			53	2															71
Iron	1	3	2																									6
Interoceanic								11	5																			16
Leamington	5												1					1										7
Markham	6		1					1	2																			10
Niagara and Grenville	2				5			1						1														9
North and Addington	1		3				6	1	2				4	3														20
North	1				6																							7
Northumberland	7	3					1	3																2				16
Northwestern	8	2																										10
Northumberland & D.	4		1						2					1														8
Ontario	1																											1
Orillia	6	7	7			1	3	6	3																			34
Orillia	1					2																						3
Orillia	1		7		1		2	4					1															16
Orillia		1																										2
Orillia	8	3	3			5	4	14	18			1		2	3													61
Orillia					1																							1
Orillia																												
Orillia		1	2		1									1	1													6
Orillia	1					2																						3
Orillia	4	1	10		5	12	11	1	2					3														49
Orillia																												
Orillia	2		1				2																					5
Orillia		3	4										1		1													9
Orillia	4	5			3																							12
Orillia			3						1																			4
Orillia	3	6	1		4				2	1	4			4														25
Orillia	39	28	47			5	5	5	5	2		2		1	2	1		2										142
Total counties	27	16	20		10	9	10	14	13	4	3	2	8	10	6		2	2			1	2	3	1				
Total cases	187	72	112		31	45	36	195	143	5	15	4	63	30	19		3	13			1	4	5	2				985

The incidence of the disease, as shown in the tables, was most marked in three series or groups of years, the first, that of 1871-74, being coincident with or following an epidemic prevalence of the disease in Great Britain. The years 1879 and 1880 were also marked by a serious mortality from the disease, as also the years 1884 and 1885. These two latter outbreaks are of much interest, showing by comparison how different were the results as regards general diffusion over the Province of the disease in the two periods the one preceding and the other following the establishment of a provincial department of health.

That the disease reappears from time to time may be gathered from the following table showing the number of cases introduced into the Province during 1889-98.

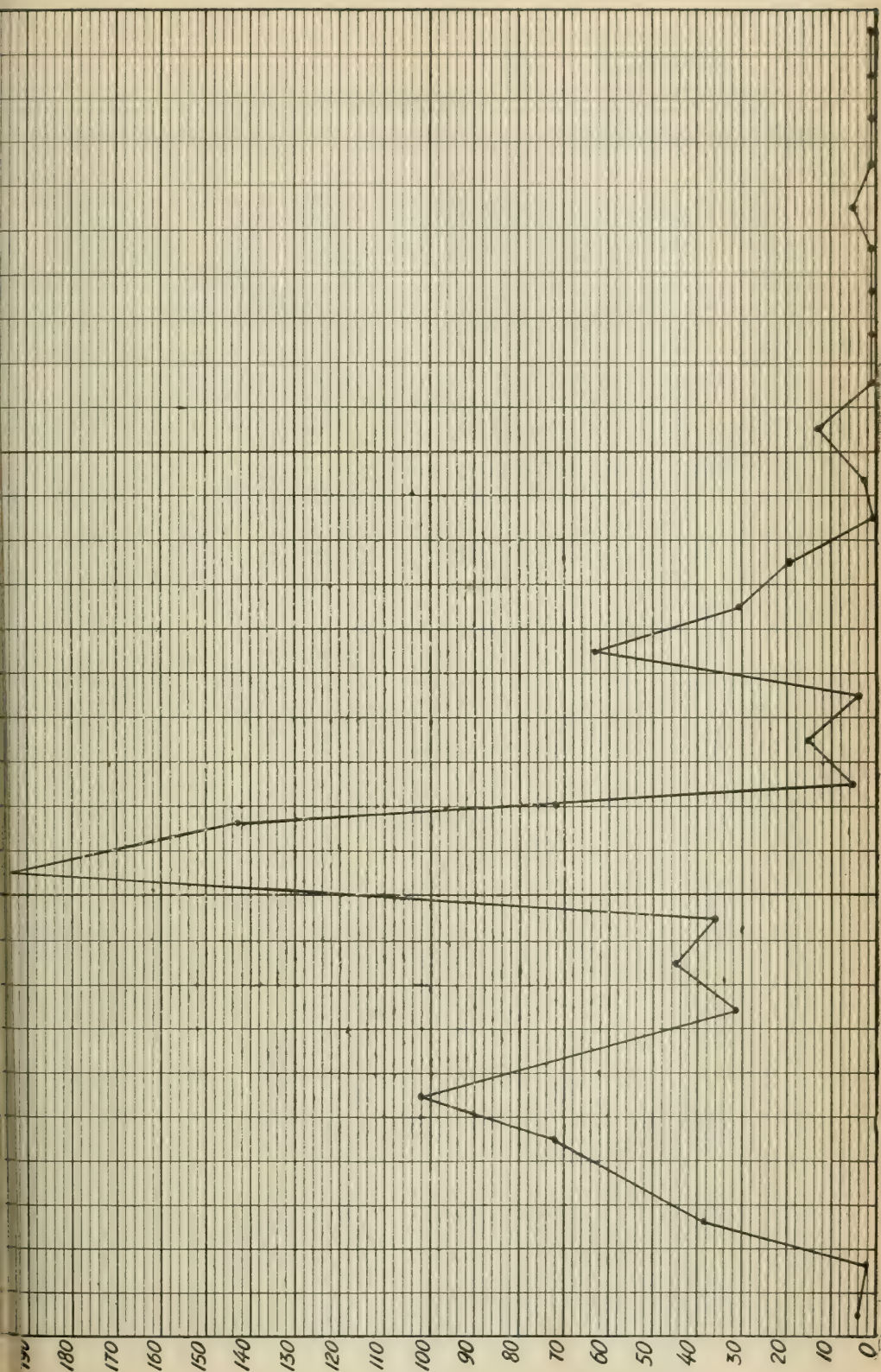
Number of Smallpox Outbreaks, Cases and Deaths, 1889-1898.

Year.	No. of outbreaks.	No. of cases.	No. of deaths.	No. of counties affected.	Remarks.
1889.....	2	47	13	2	One outbreak not early diagnosed; cause, infected clothing from Buffalo.
1890.....					
1891.....					In person of immigrants. Cases from Chicago and Detroit.
1892.....	1	2	1	1	
1893.....	2	9	3	3	
1894.....	15	36	5	5	
1895.....					
1896.....					From Detroit.
1897.....					
1898.....	3	13		2	

Of these outbreaks the three serious ones, that of 1889 in Elgin, was due to first cases being diagnosed as measles, and there being no isolation or vaccination till a general exposure and deaths had occurred, it appeared in thirteen houses. The only serious outbreak in 1894, there being fifteen distinct introductions during the year, was similarly due to a first mild unrecognized case, where protective vaccination of exposed persons was not performed.

The Elgin outbreak of 1895 was similarly due to a person, protected by vaccination, having had his clothing exposed in a ward in an hospital where a smallpox patient had been for a few hours. The remarkable fact is illustrated by the outbreaks of 1894, wherein fifteen distinct introductions of the disease occurred, that owing to early diagnosis, vaccination of exposed persons and isolation of houses, but thirty-six cases in all occurred, of the practical protection afforded by vaccination; whereas the twelve deaths in the Elgin outbreak of 1889 not only illustrate the intense contagiousness of the disease of smallpox since the first cases arose from persons at a country dance placing their wraps in a bedroom where two children sick, presumably with chickenpox, were recovering, but also the protective character of vaccination, since not a single one of the persons who died had been vaccinated.

In the succeeding chapter some of the scientific results which modern biological research have given us illustrating the reasons why vaccination has been so rich in its prophylactic effects will be dealt with; as in this has been shown the efficiency of a public health service in dealing with the disease. The resumé therein given will also serve to recall the services to humanity of a discovery which, made a hundred years ago, has in all civilized countries caused what was once the scourge of northern peoples to practically disappear as a cause of mortality. While outbreaks have not failed to make their appearance, the following diagram will make even plainer than tables the truth of the statement as regards Ontario.



CHAPTER II.

THE SCIENTIFIC BASIS OF THE PRACTICE OF VACCINATION AGAINST SMALLPOX.

Everyday experience of life teaches us that the memory of man is essentially short, and history is our teacher that in the political, social or moral sphere man is constantly repeating the mistakes of past centuries and as constantly devising some supposedly new scheme, in essence but a *fac simile* of some old idea, as a panacea for the evils which afflict mankind. To-day we have almost forgotten that smallpox was *par excellence* the scourge of past ages. Macaulay writing of the death of Queen Mary, wife of William III., says: "That disease over which science has achieved a succession of glorious and beneficial victories, was then the most terrible of all the ministers of death." Smallpox was always present, filling up the churchyards with corpses, tormenting with constant fears all whom it had not yet stricken, leaving on those whose lives it spared the hideous traces of its power."

Dr. S. Monkton Copeman in his interesting lectures, referring to a recorded outbreak of smallpox in 1722 in Ware, England, states that the population of the town was given as 2,515 of whom 1,601 are said to have had smallpox previously, the remaining 914 therefore being presumably susceptible to the disease. During the course of the epidemic, of those 914 persons 612 were attacked of whom 72 died." The antiquity of the disease is recognized since history informs us of the practice of how by taking smallpox crusts and by introducing them into the nostrils, the ancient Chinese and Hindoos produced inoculation against the disease.

Later this practice was introduced into England through the writings of Lady Mary Wortley Montagu. Writing from Turkey where she lived as wife of the Ambassador to the Court of the Sultan, she says: "The smallpox, so fatal and so general amongst us, is here entirely harmless by the invention of engrafting, which is the term they give it." So successful did the practice become in England that we are told 20,000 persons were safely inoculated by the two brothers Sutton, carrying out the method of procedure of the famous Sydenham, and without a single death. In practice, however, owing to the lack of an compulsory isolation of such patients the disadvantage resulted that inoculated persons became the vehicle of transmitting the smallpox to others who had not been protected against the disease, so that the total mortality from the disease was rather increased than diminished, the practice not having become general.

Such was the general situation when Dr. Edward Jenner, a student of the famous Dr. John Hunter, and a true scientific investigator, continued his lengthy observations on the protection against smallpox conferred upon the dairy-maids by their contracting cow-pox, a disease prevailing amongst the milch cows of the Gloucestershire district. On May 14th, 1796, it may be said he made the *experimentum crucis* when he inoculated the boy, James Phipps, by inserting lymph from a vesicle on the hand of Sarah Nelmes, dairy maid, into two superficial incisions in the boy's arm.

It was yet left to Jenner to prove that the boy was proof against smallpox. Dr. Jenner in the following July inserted virus from a smallpox pustule by several similar incisions into the boy's arms. No disease followed. In 1798 Jenner published his investigations, which met with such marvellous public favor that within a few years the method had become known in every part of the civilized world.

So much for the fact of prophylaxis against smallpox having been established. The scientific question still remained: Is cow-pox or vaccinia the same disease in the cow as smallpox in man, only modified? Experimentation from 1801 till the present has gone on, and much discussion *pro* and *con* has taken place. Dr. S. M. Copeman in his lecture on the Natural History of Vaccinia tells how Gassner of Ganzburg in 1801, after fruitless attempts succeeded in inoculating a cow with smallpox, from which a series of vaccinations of children were made, each child in the two series proving refractory

smallpox. Theile of Kasan in 1836 similarly succeeded in inoculating the cow with smallpox matter and in vaccinating children again from the cow. Badcock of Brighton carried on similar experiments through a period of 25 years, making 500 variolous experiments, and succeeded in establishing a regular depot for vaccine lymph, supplying it for thousands of children.

Later, however, the Society of Medical Sciences of Lyons began in 1865 a series of experiments, which seem to have proved that whatever lymph was got from any cases of successful bovine inoculation from smallpox patients was the smallpox lymph and caused true smallpox when inoculated into human beings.

In 1881 Voigt of the Hamburg Vaccine Establishment brought into extensive use in Germany vaccine from cows, due to a previous variolous inoculation.

Other similar experiments with similar results in different countries pointing to variations in results still leave as a matter of discussion the question of whether variola and vaccinia are the same disease modified by appearing in different species, or whether they are two distinct diseases.

Referring to the most recent experiments in which all the care due to antiseptic methods has been practiced we find that Dr. Copeman, in a series of experiments in 1892, succeeded in inoculating three calves with smallpox matter in succession, making them immune against vaccination with vaccine lymph, and in one of these obtained distinct vesiculation in several of the incisions. He also showed that by passages through a series of animals the lymph may become greatly modified. To quote Copeman's words: "The final result has, however, after a greater or less number of removes from calf to calf, been invariably the same—namely, a local vesicle is produced which by no means at our command, such as the appearance and course thereof or the protective power of the lymph derived therefrom, is distinguishable from true vaccinia."

On the other hand, Hervieux (1895), the director of the Vaccine Institute attached to the Académie de Médecine, Paris, asserts the only point of similarity between variola and vaccinia is in the likeness between the vesicles. Copeman, however, insists that if variolous matter can by a series of passages through calves be brought to a point where it produces no more serious results than ordinary vaccine lymph, if it is equally protective against subsequent vaccinal inoculations and if its vesicles can in no possible way be differentiated from true vaccine vesicles, it may fairly be asserted that vaccinia, (cowpox). is nothing more than variola modified by transmission through the bovine animal. Perhaps he says "the most reasonable interpretation of such results may be that smallpox and vaccinia are both of them descended from a common stock."

We have hitherto dealt with the history of the relationship experimentally shown to exist between smallpox and cowpox, and shall now, making further use of various sources of information, refer to vaccine matter and its preparation. Calf lymph is somewhat more viscid than humanized lymph, and as observed under the microscope contains epithelial debris, a few cells being always visible. Leucocytes are usually present, notably in the mature vesicle, and a few red blood corpuscles may also be present.

Vaccine lymph, especially untreated lymph, stored in capillary tubes tends to become turbid or cloudy. This opacity, often like a central whitish thread in a clear fluid, culture experiments show to be bacterial colonies usually proportioned to the degree of opacity of the lymph, these colonies being especially of aerobes present in the lymph before storage in the tubes, which have subsequently developed in the lymph. The lymph or plasma of vaccine is at first faintly alkaline, but tends to become distinctly acid after a length of time.

This serum contains, in addition to the vital activity of the specific organism peculiar to vaccine, an antitoxin or toxin—at any rate some product—possibly of the nature of a toxin or ptomaine which results from the vital activity of the specific organism peculiar to vaccinia.

What this organism is has been the study for years by many bacteriologists, and Copeman details in his series of lectures much of the work done and particularly that by

himself with Dr. Blaxall, in which it is stated that they were able to cultivate from the pulp taken from smallpox vesicles, inserted into an egg and kept in the incubator for a month, a very small bacillus by which inoculations made in calves produced vesicles which after passages through several animals produced a modified virus which was successfully used in vaccinating children, producing results in every way comparable to normal vaccinia. Both calves and children so vaccinated remained refractory to further vaccination with ordinary vaccine lymph.

Copeman further investigated the protective effects of both vaccine and variolous matter on monkeys, showing successful results, vesicles being about complete by the eighth day in each, that by variolous matter showing, however, more of a crust than the vaccine, and producing in some cases an eruption over the whole body. The constitutional effects were more severe with variolous matter, causing fever, diarrhoea, suffusion of the eyes and a peculiar odour.

Further experiments proved that whether vaccinated by vaccinal or variolous lymph, these monkeys proved immune to further vaccinations, even when performed months afterwards.

Until very recently, much later than in America, the practice of vaccination in England has been by arm to arm vaccination, but latterly an animal vaccine establishment has been instituted by the Local Government Board. The arguments for the use of animal vaccine are: (1) The general belief that arm to arm vaccination has become through years of transmission from person to person less protective through the nature of the lymph; (2) That other human diseases may be transmitted during the operation, such as erysipelas, syphilis and tuberculosis.

Inasmuch, however, as it has been found difficult to produce such animal vaccine from vesicles free from the presence of the ordinary pus microbes, attempts have been made since 1891, by Copeman and latterly by many others, to prepare lymph free from other germs, and the practice has now become common to prepare it for the double purpose of obviating any injurious results from their presence in inoculations, and, second, to prevent by their multiplication deleterious effects on the vaccine after being stored.

In 1896 a German commission, Dr. Koch with others, investigated the best means of preserving lymph, and in that report they state (1) that fresh lymph contains numerous microbes, whose number decreases on the addition of glycerine. Thus the commission found the streptococcus destroyed in eleven days and diphtheria bacilli in twenty days by this means.

They further found that the mixture of glycerine with distilled water could be employed to the extent of fifteen to twenty times the weight of vesicle pulp collected, without interfering with its value for vaccination purposes. Copeman and Blaxall further found that vaccine could in this way be freed from pathogenic bacteria, as those of tubercle and erysipelas, even when added in considerable quantities. This is when used in the strength of forty to fifty per cent. of glycerine. Mr. Copeman thus summarizes the advantages of glycerinated lymph:

(1) The method increases largely the amount which can be obtained without any deterioration in its quality to produce successful vaccination; (2) Glycerinated lymph does not dry up so quickly, thus simplifying the process of vaccination; (3) It does not coagulate in the capillary tube; (4) Glycerinated lymph can be produced absolutely free from the various streptococci and staphylococci usually found in untreated calf lymph; (5) The streptococcus of erysipelas, should it be present, is rapidly killed in the glycerinated lymph; (6) Tubercle bacillus is killed even if found in quantity; (7) The possibility of syphilis is eliminated; (8) The bacteriological purity and clinical activity of large quantities of lymph can be tested prior to distribution; (9) The readiness with which glycerinated lymph may be kept on hand for considerable periods of time without any practical deterioration makes its usefulness in any emergency, as where smallpox breaks out, apparent; (10) The expense of producing it is small since the amount obtainable from each calf is enormously increased.

The practice in the preparation of the lymph is after removal of the pulp from the vesicles to mix this with six times its weight of fifty per cent. solution of pure glycerine in distilled water, and thereafter store it in a cool, dark place week by week. Agar-agar cultures are made from it, each week showing a diminution of the microbes present until at the end of the fourth week the culture plates show no further development of colonies of microbes.

The duration of the activity of the lymph varies with the animal vaccinated, and upon the fineness of division of the pulp. Lymph stored for 32 weeks gave in 61 children vaccinated in five places a mean incision success of 98 per cent.

Of course, as Copeman remarks, all the stages in its preparation must be conducted with much care in order to procure these results. One of the chief requisites is that stables and laboratory be of such a character as to reduce the danger of extraneous organisms to a minimum.

Scientific methods having become developed to that point where vaccine matter is now obtainable in pure cultures, with an absolute certainty of successful vaccinations free from any mixed infection or inoculation with pathogenic germs, we are in a position to demand of the public not only the recognition of that protection against smallpox from vaccination which as already seen has resulted since Jenner's discovery over a hundred years ago, but also a ready acquiescence in having a practice carried out in their families absolutely free from any of the possible dangers which its opponents have hitherto asserted have existed.

It is quite remarkable, however, how the outbreak of a case of smallpox in the Province, and the proclamation of compulsory vaccination, at least in the municipality where the case has occurred, calls forth the newspaper correspondent, who always quotes from pamphlets statements, which, perhaps excusable fifteen years ago, shew, in their very use of obsolete terms, antedating even the birth-day of bacteriological science, an absolute ignorance of the advances in the work already summarized regarding the preparation of aseptic vaccine, and of the relations which vaccination with it has, as regards its immunizing properties against disease, to the long series of perfectly demonstrated facts regarding the anti-toxine of diphtheria and the several other diseases in which serum therapy is looked upon as one of the most marvellous outcomes of modern biological science. Writing this report with a view to educating the public, as well as to strengthen the faith of any doubters even in the medical profession, there is introduced here a diagram so neatly setting forth the facts of the protective effects of vaccination, as referred to in the first chapter, that it is reproduced from Stevensson and Murphy's Treatise on Hygiene, taken from the Report by Dr. Barry, of the Local Government Board, England, on the Sheffield smallpox hospitals.

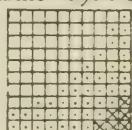
DIAGRAM showing the proportion of cases of Small-pox of different types which occurred in persons of the "Vaccinated" and "Unvaccinated" classes respectively at all and certain specified ages in the Winter Street and Sheffield Union Workhouse Hospitals

Borough Hospital, Winter Street.

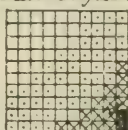
*Under 10 years
of age.*



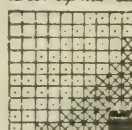
*Aged 10 and
under 20 years.*



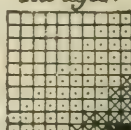
*Aged 20 and
under 30 years.*



*Aged 30 years
and upwards.*

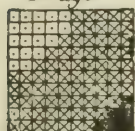


All ages.

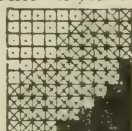


Vaccinated Class

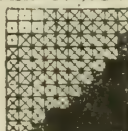
*Under 10 years
of age.*



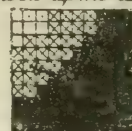
*Aged 10 and
under 20 years.*



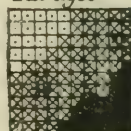
*Aged 20 and
under 30 years.*



*Aged 30 years
and upwards.*



All ages.



Unvaccinated Class

■ *Confluent.*

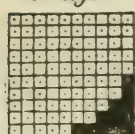
⊠ *Coherent*

□ *Discrete.*

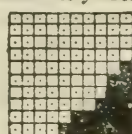
□ *Varioloid*

Sheffield Union Workhouse Hospital.

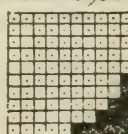
*Under 10 years
of age.*



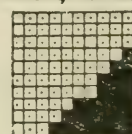
*Aged 10 and
under 20 years.*



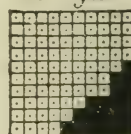
*Aged 20 and
under 30 years.*



*Aged 30 years
and upwards.*



All ages.



Vaccinated Class

*Under 10 years
of age.*



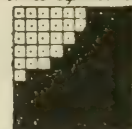
*Aged 10 and
under 20 years.*



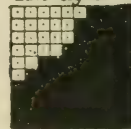
*Aged 20 and
under 30 years.*



*Aged 30 years
and upwards.*



All ages.



Unvaccinated Class

■ *Confluent (including Coherent.)*

□ *Discrete (including varioloid.)*

NOTE. Cases with regard to which the Hospital records were incomplete have not been included in this diagram.

From Report on Smallpox in Sheffield, England, by Dr. Barry, Local Government Board.

As is remarked by the author of the extremely valuable article on smallpox and vaccination in that text book, the value of vaccination is to be learned, not only from the general absence of smallpox but from its occasional presence.

While such statistics as those set forth in the diagram are but the repetition of results everywhere, it cannot be overlooked that in view of the compulsory nature of the legislation regarding vaccination in Canada, as in most other civilized countries, the responsibility resting upon governments and all public authorities of supplying conditions under which the most absolute protection must be given to those to in whom the operation requires to be performed is beyond question. In a prolonged and very interesting discussion in 1897, introduced before the Medico-Legal Society of New York, by Dr. M. R. Levenson, the following was supplied by your secretary, as his summary of the present position of vaccination, the reasonableness of which the further work on serum immunity during the last ten years has seemed only to strengthen.

“Referring to the question in a five minutes’ discussion, it may be broadly stated that compulsory vaccination has, in my opinion, passed both its medical and legal phases, and is simply one of many questions in “social evolution.”

To orient the problem ;

1st. The statistics of a century have absolutely demonstrated that by compulsory vaccination, smallpox has been, and can be eliminated from the category of diseases.

2nd. That even with a compulsory vaccination law imperfectly administered, varioloid is a disease less fatal than measles.

3rd. That the objections which have been taken to the practice of inoculating healthy persons with the materies morbi of attenuated smallpox, cannot be from the standpoint of a lack in its prophylactic efficiency ; but from (a) the dangers which may accrue to a patient of inflammatory complications during the progress of the vaccinia, and (b) of dangers due to impure vaccine lymph.

4th. Were there to-day practical objections owing to deaths resulting from either cause through the operation, it must at once be admitted that compulsory vaccination is vicious legislation, as contributing directly to the injury of the individual and therefore to the state and not to be defended.

5th. In practice, such objections do not exist, since with the preparation of lymph, under the direct supervision of trained bacteriologists, its action may be obtained in a normal manner without any lessening of its potency, while the absence of dangerous mixed infections in the lymph may be wholly prevented. The surgical operation is of all the simplest, and infection, through the operation, is to be set down to defective surgery.

6th. While, however, compulsory vaccination has, in my opinion, more than justified itself, the practical question of how the law should be applied is pertinent to the discussion. Were vaccination universal and systematic in practice, it would soon not be necessary, as the disease would be eradicated. Inasmuch, however, as immigrant and other travel keeps introducing the disease into seaports and other large cities with dense populations, the compulsory vaccination of school children as a routine measure is demanded.

7th. In Canada this has not been found continuously necessary in rural districts, though still carried out in many sections, owing to the fact that sanitary organization has attained a degree of development by which a centre of infection is promptly isolated ; persons within the radius of the infection are compulsorily vaccinated, and should accident have seemed likely to have caused many to be exposed, whole districts may under proclamation of the state or municipal authorities be at once brought under the operation of the compulsory Act.

8th. In conclusion, it may be stated that while in practice, with smallpox present or in the vicinity of any district, vaccination is carried out generally under compulsory law with penalties attached, yet it seems reasonable that inasmuch as the refusal in individual cases to have the operation performed, which may be due to personal fears of inoculation and is lacking in those qualities which would create a moral wrong, such refusal can be met successfully by compulsory quarantine of persons or families at their own expense during periods of immediate danger, and of enforcing non-attendance of unvaccinated children at school : since the parents of such children have no right to claim educational advantages from the State which holds that compulsory vaccination of all school children, as in a large city, is necessary to the welfare of the State and the safety of its citizens.

* H.

But it is further of special interest and importance to illustrate how scientific methods are still further elucidating the fundamentally scientific basis of the practice of vaccination by showing that as in diphtheria, anthrax, bubonic plague, rinderpest, typhoid and other diseases, the presence of the disease germs or their toxins in the system of men and animals there produces what are called anti-toxins, which in some manner create a vital resistance of the system for longer or shorter periods to the disease, which has been introduced. Of this class of work relating to the immunizing effects of vaccination through the production in the blood serum of an anti-toxin to both vaccinia and variola or smallpox, I shall give the summary of some remarkable experiments carried on in Paris, France.*

The experiments and reports thereon are by M. M. A. Bédère et Ohambon et Menard, directors of the Institute of Animal Vaccine, Paris.

The experimental study shows that the serum of a vaccinated heifer has some immunizing properties against inoculated vaccine. Such serum injected into an animal of the same species just before a number of subepidermic inoculations causes to some extent incomplete immunization, but yet sufficient to render sterile a large number of the inoculations made, to give the others a rudimentary and aborted appearance and especially causing such to lose all appreciable virulence of the lymph, since it will not inoculate either infants or heifers. The modifying of the virulence of the lymph is much more marked than the change in the appearance of the vesicle. This modification reveals itself even when the inoculation with lymph is delayed one or two days. Thus the serum exerts not only a preventive power but a curative power. Though still much more feeble than the curative power following later after inoculation from a vesicle, this immunizing action always shows itself very rapidly. The immunity conferred by vaccine virus on the other hand develops but slowly; indeed not till after eight days. It is only after the lapse of such a period that similar inoculations made remain sterile.

In the first experiments a definite amount of vaccine was injected under the skin, which was followed by a series of inoculations made on the skin in the usual way, with the interval of a day between, in the first heifer; then after two days, in the second; after three days in the third, and so on.

The following summarized give the results of the several experiments when the inoculation with vaccine was delayed three days: *Experiment 1*: A heifer received an injection under the skin of the left flank with the contents of a large tube of vaccine, formed of glycerinated pulp prepared ten months previously (the amount being about five centigrammes of boiled water, five centigrammes of glycerine and ten centigrammes of the pulp scraped from the vesicles.)

Three days after, the animal was inoculated with vaccine virus on both sides of the body, by linear incisions of two centimetres in length, three or four centimetres apart, to the number of 80 to 120 on each side.

At the same time a test animal injected was vaccinated in the same manner. In both the vaccinal eruption appeared after the usual interval, with normal appearances, practically the same in both. All the inoculations gave rise to vesicles. From both, two collections of vaccine lymph, twenty-four hours apart were taken. From both, also, a glycerinated pulp was prepared dating from the 4th, 5th and 6th day from the date of inoculation. Those from the test animal were considered as normal and used for comparison as to virulence of that from the injected animal.

To this end with proper precautions non-vaccinated infants were vaccinated with three punctures on each arm, on the right arm with one of the three normal vaccines and at the same time on the left arm with lymph of same date from the experimental animal. Five infants were vaccinated on the right arm with normal vaccine and, on the left with test lymph taken on fourth day; eight infants with lymph taken on fifth day and seven infants with lymph taken on sixth day. On all the infants the inoculations gave beautiful

*See Annales de l'Institut Pasteur, Nos. for Dec., 1898, Jan. and Feb., 1899.

vaccine vesicles, without notable differences on the two arms. There exists therefore, no appreciable difference in the vesicles from the two sources and of corresponding age.

Experiment 2.—Where a heifer was injected with a glycerinated lymph of two and a half months standing; after four days this animal was inoculated with the same lymph in the manner already described. At the same time a test animal was vaccinated. The evolution of the vaccine vesicle in the two was very different. Three days after the inoculation the test animal not only does not show any swelling about the incisions, not even any thickening of the skin, and no redness; it still is in the incubation stage. At the same time the experimental animal shows an eruption manifestly premature, more advanced, even in its evolution, than another animal vaccinated twenty-four hours earlier. All its incisions are surrounded with a very marked red areola, indicating a strong congestion, the subjacent tissue is infiltrated to the point of forming a notable elevation to sight and touch. Six days after the injections beneath the skin, the eruption of the experimental animal is composed of large pustules, prominent, wide, filled with an opaque liquid, and surrounded with a zone of great congestion, several inoculations, however, being partly aborted.

These pustules are for the most part remarkable from their festooned contours and polycyclic, a certain indication that the inoculated germs have not developed fully and that each pustule is formed by the re-union of only a small number of sub-epidermic colonies, only, however, three or four. On the test animal the eruptive elements are much less large, less prominent, filled with a fluid still mostly transparent. Some, however, are opaque, without a congested tint at the periphery. They have regular contours, evenly outlined, and not appearing formed, as those in the experimental animal by the confluence of three or four vesicles first rounded.

From the experimental animal, at intervals of twenty-four hours, lymph is taken in three lots, and a glycerinated pulp is prepared in three lots, dating the fourth, fifth and sixth days after the sub-epidermic inoculations.

To measure the virulence of each of the three vaccines non-vaccinated infants were inoculated as before on each arm, the right with normal vaccine taken from the test animal six days after inoculation, the left with lymph from the test animal taken on the fourth day after inoculation; also infants with fifth and sixth day experimental lymph. On all the infants the vesicles on both arms show no differences. There seems, then, no difference in virulence in the two lymphs. It is notable, however, that the fourth day lymph gives vesicles particularly large and prominent, more beautiful than those coming in the same subjects from normal vaccine. It has, then, an accentuated virulence.

Experiment 3.—Made after a sub-cutaneous injection five days preceding the inoculation gave as results:

- (a) Matured vesicles twenty-four hours at least before the non-injected test animal.
- (b) Vesicles notably modified in external appearance and arrested in its development.
- (c) A lymph of normal virulence five days after inoculations, of very attenuated virulence after six days.

Experiment 4.—Made after an injection preceding by six days the inoculation giving as a result:

- (a) Vesicles developed about twenty-four hours sooner than the normal.
- (b) Vesicles very much modified in external aspect, rapidly and notably arrested in their development.
- (c) Vesicles containing a lymph of almost no virulence four days after inoculation, and of no virulence five days after inoculation.

Experiment 5.—The injection preceding the inoculation by seven days gave as results:

- (a) Vesicles appearing about twenty-four hours in advance of normal vaccination.

(b) Vesicles very modified in external appearance, rapidly arrested or aborted in their development.

(c) Lymph with almost no virulence four days after inoculation, and no virulence five days after inoculation.

These various experiments confirm the fact that the immunity following sub-cutaneous injection in its period of gradual development from the fourth to the eighth day shows itself externally by an arrest of development, more or less pronounced, of the eruptive elements. The proportion of sterile inoculations, or almost sterile, increases with the daily progress of the immunity and enables us to measure with the eye its increasing degree.

The experiments further show that with the arrest of the eruptive elements there corresponds an attenuation more or less complete of their contained lymph. With these signs are revealed and measured the gradually increasing immunity as the days follow the sub-cutaneous inoculation of vaccine virus.

In these two ways, also, has been revealed and measured the immunizing action: both preventive and curative, of the serum of a vaccinated heifer; this is not a single action but comports in a series of varying degrees with the doses of serum injected and with the time of injection.

The principal fact developed by these new researches is that in heifers successively injected under the skin and inoculated upon the epidermis, there results between the subcutaneous vaccination and the complete loss of virulence of vaccine lymph an interval of at least eleven or twelve days.

The same experiments performed on guinea pigs gave similar results.

The protective action of serum as shown by its effects upon the vaccine virus has been studied with the serum of convalescents from smallpox, from vaccinated horses, vaccinated men, and from animals inoculated with smallpox virus. All have been found to comport themselves similarly as opposed to activity of vaccine virus.

M. André Jousset, has studied the physical and chemical qualities of the special substance which gives this property to such serums.

It has been clearly proved that the serum from such vaccinated animals mixed with fresh vaccine at once renders it inert.

Thus a non-vaccinated heifer is aseptically bled by a puncture in the jugular. It is then vaccinated in the usual manner by multiple incisions. The eruption appears in the usual manner. Fourteen days after the vaccination it is bled a second time. These two bleedings yield two serums taken aseptically. A test-tube is almost completely filled with a sample of each serum of 5 to 6 c.c.

To each is added the contents of two or three tubes of vaccinal pulp of same crop. The tubes are carefully shaken, covered with rubber caps sterilized. They are then laid horizontally to aid complete mixing of serum and pulp. At the end of 24 hours they are shaken again, placed vertically and the pulp allowed to settle. After another 24 hours, by aspiration, almost all of the two test serums and the mixture of serum and vaccine pulp in each tube is placed in sealed tubes. Thus then are two vaccines prepared in the same manner from the two animals. To test their virulence, it is only necessary to vaccinate the same animal on different sides of the body. This was usually practised in the inside of either thigh.

Thus the left side was vaccinated with 15 incisions with vaccine treated with serum from non-vaccinated heifer, and the right side with that from the vaccinated animal. This animal is immediately vaccinated on the side of the belly with fresh vaccine virus which has not been in contact with any serum. After six days the eruption is at its height, the normal vesicles of the flanks show the receptivity of the animal. The vesicles on the perineal spaces may thus after another day has elapsed be accurately compared with the normal vesicles. It is found that the inoculations with lymph mixed with serum from the non-vaccinated heifer have produced perfect vesicles and have lost nothing

of their virulence. On the other hand, the vaccine mixed with serum from the vaccinated heifer has not produced any appreciable result, and practically no inflammatory action. Thus it may be said that the serum of the vaccinated animal produces on the vaccine virus most certainly anti-virulent effects, to say the least; in the same way as we speak of the antitoxic and the anti-venomous effects of certain serums.

Experiment in 36 cases on horses treated in the same manner as the heifer produced identical results.

Similarly, 30 experiments were made on human subjects. Each patient was bled, yielding 20-30 grammes of blood by a hypodermic syringe introduced into a vein of the arm.

The case of a woman 44 years old, vaccinated in infancy, is given. She was bled then three days after was inoculated on left arm by three incisions with fresh vaccine from the heifer, which gave beautiful vesicles, showing no trace of the immunity of infancy. Some 32 days after this vaccination, some blood was again taken from the woman. The serum taken from the patient bled, studied in its action on the vaccine virus, comparatively with that taken from the unvaccinated heifer, resulted as follows:—The left side of the perineum of an unvaccinated heifer is vaccinated with lymph treated with serum of an unvaccinated heifer, while the right side was vaccinated with vaccine treated with the lymph from the woman vaccinated a month before. The result was that the vesicles on the left side were perfect, and those on the right side were aborted as in the previous case of the heifer.

In the next experiments, the effects of mixing vaccine with serum from patients recovering from smallpox, were shown. Blood was taken from ten patients. Thus a man was bled on the 23rd day of the disease, the 20th from the beginning of the eruption. Some days later a heifer was inoculated as before with vaccine bottled for 48 hours, taken as above from the patient. Compared with fresh vaccine not so treated, the incisions showed the complete anti-virulent action of the blood serum. The same results exactly were got by vaccinating a child on both arms; the one with fresh vaccine, and the other arm with vaccine treated with lymph. The one arm had a perfect vaccination, the other produced no reaction whatever.

These experimenters further tested the serum of monkeys, which they succeeded with alone amongst lower animals in inoculating with lymph from vesicles in smallpox patients. On the fourth day after inoculation, the forty-one incisions became papulo-vesicular, very similar to those of vaccinated children on the fourth day.

The inoculated monkey became sick and died on the 14th day after the inoculation. A few minutes before it died, blood was taken from its femoral artery, giving some 2 c.c. of serum.

A heifer was vaccinated as before on the right side with vaccine treated with this serum; the other side with fresh vaccine. The result was as before, the treated vaccine proved non-virulent.

The lymph from a smallpox vesicle in a woman who had smallpox, and who had been injected with serum from a vaccinated heifer as a therapeutic measure—forty-eight hours before the lymph was taken—proved ineffectual in any attempt to inoculate a monkey with smallpox.

These experimenters have further shown that while they could not inoculate horses and other animals with smallpox by the skin like the monkey, yet by injecting them into the cellular tissue with smallpox lymph, the blood-serum afterwards proved sufficient to make vaccine virus inactive.

Experiments with the serum of vaccinated animals showed that its anti-virulent action was not destroyed by heating to 70° C; and further that its properties were not removed by filtration through a Chamberland filter; and further that the vaccination of the mother shortly before the birth of a child, makes the child immune to vaccine virus.

Summed up, the conclusions of this most interesting series of experiments are :—

1st. The serum of a heifer taken fourteen days after inoculation, is endowed not only with immunizing properties, preventive and curative—but it also produces when mixed with vaccine, an anti-virulent effect.

2nd. It produces in horses and probably similar animals, the same anti-virulent properties as in cows and men.

3rd. Vaccination produces the anti-virulent property on the serum, however the inoculation be made, whether by the skin, the blood, or the deeper tissues.

4th. The serum from convalescents from smallpox exerts the same anti-virulent action on vaccine as does that from variolized animals, as monkeys.

5th. The anti-virulent substance of the serum of man and animals immunized against vaccine and variola has a stable composition, offers great resistance to heat, light, time, persists when dried and does not readily putrefy.

6th. The blood takes several days after inoculation to acquire anti-virulent properties fully, in the heifer after from nine to thirteen days, and is at the very moment that the vaccine or variolous virus loses all activity.

7th. The period of vaccinal immunity varies much with different species, but the anti-virulent property of the blood goes on decreasing, and may disappear completely, although the skin in the same person may still resist re-inoculation with vaccine.

8th. This anti-virulent property varies with different persons, but persists for twenty-five years and even fifty or over, with persons against variolous and vaccinal infection.

9th. The production of the anti-virulent substance in the course of vaccinal or variolous infection and its appearance in the blood plasma, constitute a reaction of defense of the organism intimately allied to the arrest of the morbid process, and to the development of immunity. We do not yet know whether this substance acts directly on the infective agents as a virulicide or whether it acts as a stimulant on the tissue cells of the organism.

CHAPTER III.

VARIATIONS IN THE VIRULENCE AND INFECTIONOUSNESS OF PATHOGENIC MICRO-ORGANISMS.*

When we consider the infectiousness of a micro-organism or the gravity of the manifestations of its virulence in an infected animal, we recognize at once, that there frequently exist wide variations in intensity. These variations may be due to either a difference in the resistance of the infected organism, that is to a variation in immunity, or to a greater or lesser degree of power to infect, that is to a variation in the virulence in the virus.

That natural immunity may vary considerably is well known, and that unfavorable hygienic conditions of all kinds are potent influences in diminishing this natural immunity is also recognized; but in many infectious diseases, epidemiological studies show that the more important factor in determining the morbidity and mortality is the virulence of the virus.

It is true that the two conditions of immunity and virulence act and react on one another, and in many instances may be separated with difficulty. We must admit that an organism of low virulence may infect an animal with slight natural immunity, whilst the same organism would not infect another animal with marked natural immunity; but if we take such a specific instance as the history of diphtheria in England during the present century, we see that, in spite of improved hygienic conditions, the mortality rate, until the introduction of anti-toxin, has varied but little, and whatever variation has occurred has been more cyclic in character, rising gradually through a series of years to a maximum, then falling to again rise.

If we look more closely into the history of diphtheria, we see everywhere evidence of this variation in virulence of the diphtheria bacillus.

The percentage mortality of diphtheria in Europe, without anti-toxin treatment is undoubtedly higher than in America, notably higher than in Ontario. Looking at European statistics as a whole we find a mortality rarely under thirty per cent, and frequently as high as thirty-seven per cent. On the other hand Ontario statistics show a much lower mortality even with our undoubtedly incomplete morbidity returns. But in Ontario itself we find great variations in different cities and towns and in the same town in different years.

If we take, for example, the statistics of such a city as Brantford, in which notification has been fairly thoroughly carried out, we find the following results:

For the years inclusive of 1890 to 1895 there were 384 cases with 49 deaths, or 12.07 percentage.

For the individual years the returns are:

	Percentage.		Percentage.
1890	11.5	1893	11.1
1891	15.0	1894	13.8
1892	4.0	1895	21.1

As a rule the percentage mortality in Ontario is under twenty, but occasionally we find that it runs much higher, for instance:

Hamilton.	Per cent.	Ottawa.	Per cent.
1893	25.5	1892	30.0
1891	37.5	1894	29.9
		1895	27.9
Stratford.	Per cent.	Stratford.	Per cent.
1891	46.1	1892	25.0

*By J. J. Mackenzie, B.A., Bacteriologist to Provincial Board of Health.

The only explanation of these variations is a difference in virulence in the infecting bacillus.

From time to time the diphtheria bacillus has been isolated in pure culture from cases sent in to the laboratory for diagnosis, and I have tested the virulence of the pure cultures for guinea pigs. It is, of course, impossible to draw exact conclusions from the virulence of the bacillus for guinea pigs, as to its virulence for man, as many experiments have shown that this is unsafe; but the facts are interesting as indicating the extent of variation. The results are as follows:

Experiment A.—Specimen isolated from a larynx at an inquest, two weeks after burial:

Dose.	Weight of guinea pig.	Result.
1 c.c. 48 hour bouillon culture	450 grms.	Death in two days.

Experiment B.—Specimen isolated from an infected throat three months after the disappearance of the membrane:

Dose.	Result.
1 c.c. 48 hour bouillon culture	Death in two days.

Experiment C.—From mild case of diphtheria, with very slight exudate:

Dose.	Result.
0.5 c.c. 48 hour bouillon culture	Death in five days.

Experiment D.—From case of otitis media (disease of middle ear):

1 c.c. 48 hour bouillon culture	Induration at point of inoculation; animal recovered.
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Experiment E.—From infected nose (A. M.); no clinical diphtheria; no discharge from nose:

0.99 c.c. 48 hour bouillon culture, weight of guinea pig 500 grms.	Animal died on 15th day. Extensive necrosis of skin.
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Experiment F.—From mild diphtheria A. B.:

0.99 c.c. 48 hour bouillon culture, weight of guinea pig 500 grms. .	Animal did not die, lost weight and had extensive area of necrosis of skin.
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Experiment G.—From nasal discharge S. U.:

1.09 c.c. 48 hour bouillon culture, weight of guinea pig 500 grms.	Animal died in 18 days.
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Experiment H.—From slight sore throat, U. K.:

0.99 c.c. 48 hour bouillon culture, weight of guinea pig 500 grms.	Animal died in 18 days.
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Experiment I.—From infected throat:

0.98 c.c. 48 hour bouillon culture, weight of guinea pig 500 grms. .	Animal lost weight and showed extensive infiltration of skin but did not die.
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Experiment K.—From severe laryngeal diphtheria:

1 c.c. 48 hour bouillon culture	Animal died in 48 hours.
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It will be seen from these results of experiments that for the guinea pig there may be a very marked variation in virulence. All these animals were given approximately the same dose of the culture of bacilli, yet the results were quite different. As a rule we notice also that the most actively virulent cultures came from the most severe infections in man.

When we turn to the bacillus of typhoid we find the same variations in virulence.

In epidemics of typhoid in Ontario we see that the mortality varies considerably in different epidemics and in some instances quite markedly. If we take specific instances, we may refer to two rural epidemics, investigated by the writer which show markedly the effect of virulence. The one occurred in the Township of East Zorra in Oxford County, in October, 1897, the other in the Township of Hamilton, Durham County, in the autumn of 1898. In both cases, it was impossible to trace the origin of the first case but the relationships of subsequent cases were easily traced. In both cases hygienic conditions were apparently the same, the population attacked were of the same class and apparently endowed with the same degree of immunity, that is they belonged to a well-to-do farming class. The East Zorra epidemic showed eighteen cases and eight deaths, the Hamilton epidemic showed twenty cases and one death. As pointed out in the report upon the East Zorra outbreak the most striking characteristic aside from the high

mortality was the evident infectiousness of the virus ; in the Hamilton epidemic, the mortality was low and there was not so much evidence of direct contagion, the cases seemingly being traceable rather to polluted water. These facts, then, intense virulence and intense infectiousness seem to go hand in hand and *a priori* one would expect such a connection.

There are many other instances of variation in virulence which might be given but the above will suffice.

An important question from the standpoint of public health is that of the causes of these variations. What are the conditions which determine them?

Some of these we know from the results of experimental investigation, but all the conditions are not yet thoroughly understood. There seems to be no doubt but that the tendency of pathogenic bacteria is to lose their virulence when allowed to grow outside the body ; that the longer they have grown outside the body the lower their virulence and that once lost it is regained with difficulty. All sorts of conditions produce this. Thus simple cultivation in the laboratory is most effective ; a temperature higher than the optimum for their growth, the presence of substances in the culture medium which tends to weaken the growth. To restore lost virulence on the other hand is a still more difficult problem. The method which is usually adopted in the laboratory is its passage through the animal body. Pasteur found for example that in rabies the virus from dogs, infected with the so-called street virus, varied considerably in virulence. Inoculated into rabbits it produced death in from fifteen to thirty days. When, however, the virus was passed from rabbit to rabbit, the incubation period became shorter, and death followed in a shorter time, until finally a degree of virulence was reached in which the animal invariably died within eight days. This condition remained constant, that is the virulence had reached its acme or it was fixed.

The same observations have been made for the streptococcus. Passage from rabbit to rabbit increases the virulence so that finally a stage is reached where a single cell or microbe is sufficient to produce a fatal septicæmia in the animal.

For typhoid, diphtheria and other diseases, the same fact has been experimentally established. Passage from susceptible animal to susceptible animal will apparently always increase the virulence of a micro-organism.

This fact is a most important one from a public health standpoint ; the rapid spread of an epidemic disease through a susceptible population always results in an increase in virulence of the disease. Many epidemiological observations give support to this view, the most characteristic being the spread of such diseases as measles, smallpox and syphilis amongst aboriginal races. Whenever this has occurred the virus has increased enormously in virulence, not only for the relatively susceptible aborigines but also for the immune white races who may be exposed to the disease. When, therefore, an epidemic disease breaks out in any community the necessity for checking it is two-fold, primarily to lessen the number of cases and secondarily to prevent any possible increase of virulence, due to the rapid passage of the virus from individual to individual.

Aside from the above normal increase in virulence which results from passage through animals we sometimes meet with cases in which there seems to be a sudden increase which is not so easily explained. An example of this is shown by the recent epidemic of smallpox in Ohio. In over a thousand cases the mortality has been less than one per cent. The disease has been so mild as to lead to its being repeatedly overlooked by experienced physicians. The virus from this outbreak, however, has been introduced into Quebec and the French counties of Ontario, with the result that there has been an outbreak of typical smallpox with the usual mortality. Vaccination to a certain extent may account for some of the difference in the virulence of the virus in Ohio and Quebec, but not entirely.

This fact, then, of the gradual or sudden increase in virulence must always be kept in mind when an epidemic occurs, since should it appear, the difficulties of the health officer and physician are correspondingly increased.

Especially do we see the practical utility of thorough isolation of even mild cases of disease, as of scarlatina and diphtheria ; since the contagion spread from child to child, that is from mouth to mouth is as from animal to animal, and therefore possesses a virulence greater than inoculation from infected clothing, or from the air of an infected house. In the latter case many interesting illustrations could be cited of public buildings, such as orphanages, institutions for the blind, and children's hospitals, the air of which, owing doubtless to microbes being present in the dust on floors, walls, etc., seems to be permanently infected. But meanwhile the microbes have become so weakened in virulence in their existence outside the body, as to cease almost to be infective to the inmates, but which will only too readily attack those children who may enter the home, and which have not as it were become immune to infection from that particular atmosphere. This immunity which may be called house acclimatization is on a par with that gradual acclimatization which takes place in the residents of malarial climates, and indicates the aptness of what was stated in the beginning of the chapter, that there are necessarily the two influences acting and re-acting upon each other, viz. : that of virulence and of immunity, both of which are of necessity terms purely relative.

CHAPTER IV.

THE BIOLOGICAL PRINCIPLES INVOLVED IN THE PURIFICATION OF THE SEWAGE OF TOWNS.

While the comparatively small populations of the towns and cities of Ontario, and their location in most cases on the shores of the great lakes and rivers have hitherto made the question of the pollution of streams of relatively little importance, compared with that in the densely populated countries of the world, and of the older industrial States of the American Union, yet the fact that the urban populations of the thirteen cities of Ontario alone amount to 436,000, while but fifty towns and cities are more or less sewered, clearly indicates that the laws against the pollution of streams, contained both in the common law of Canada and the Public Health Act have served and will hereafter still serve to prevent the development of conditions which older countries have found to be the problem most difficult of solution with which urban municipalities have had to deal.

The primary cause in the creation of the problem of sewage disposal has lain in the fact that the waste organic materials from man and animals have been looked upon as having no commercial value commensurate with the cost necessary to their transportation, either as to the land or to their manufacture into any commercial product. Especially has this been true in new countries, such as Ontario, where the virgin fertility of the soil was for many years deemed adequate for yielding, without the cost consequent upon the use of manures and other fertilizers, crops giving a good financial return for the labor involved.

The agricultural experience of the last twenty-five years in the older settled parts of the Province has, however, shown how serious has been the mistake made, and to-day we see that the agriculturists and horticulturists near the larger centres of population are taking every opportunity of using, to their fullest extent, all town refuse, whether manure or offal and waste from various industries, to restore to the soil its lost organic and mineral constituents so necessary to intensive cultivation. The cities of the old world, both of Europe and Asia, have, however, largely added human organic wastes to this class of soil fertilizers, and the Western states of the United States have seen the successful introduction of the Chinese methods in market gardening, wherein nightsoil plays so important a part.

In all this matter, however, we have seen on the part of the agriculturist an absence, first, of an appreciation of the value of and need for such fertilizers, and further, a notable ignorance of their value, and perhaps a still greater dislike to their utilization.

Under such circumstances, it is clear that there has not been cultivated any idea on the part of urban populations of doing anything towards the disposal of town refuse and sewage, except that of adopting the cheapest possible methods for its disposal, compatible with a due regard either for their own safety or the law against pollution of streams. Indeed, we cannot be said to have got beyond this stage since we see our two largest cities, Toronto and Ottawa, discharging all their sewage into Lake Ontario in the one instance, and into the Ottawa river on the other; and it has only been within the past two years that, under legal compulsion, we have seen Hamilton introduce chemical purification sewage works, and London preparing to dispose of her sewage on a sewage farm. The towns of Berlin and Waterloo, situated inland on mere creeks, have been forced to adopt disposal on sewage farms, and it has been only within the past few years that the Government public institutions have instituted methods for dealing with their sewage.

In Ontario, therefore, as in England and elsewhere, the introduction of methods for dealing with town sewage, other than the pollution of water courses, has been and must be, in the nature of things, gradual, being determined in the case of each town by either

a fear of the pollution of its own water supply, or by compulsion through legal action brought by another municipality affected by such pollution, as occurred in 1898 in the case of the city of Stratford.

With a view to encouraging the evolution of sewage disposal works, it therefore seems proper that a chapter should be devoted to the biological principles involved in such.

By "sewage" is meant the liquid contents of a sewer; and, in water-closet towns this means of all human excreta, kitchen slops, washing water and the organic wastes carried to the sewers by storms, from the streets and lanes. In most, indeed in all towns, it means stable drainage, industrial wastes, such often as blood, and even offal from slaughter houses in some cases, and chemicals and refuse from woollen factories, tanneries, gas works, breweries and distilleries and the multifarious industries of large towns.

It is, therefore, very apparent that sewage will vary greatly under different circumstance; and indeed, it is this fact which constitutes, as we shall see, one of the chief difficulties in disposing of sewage satisfactorily. Organic wastes, such as wastes from woollen factories and paper mills serve to clog filters rapidly, while gas liquors and other chemicals will at one time tend to destroy the living organisms or microbes which break up organic matters or at another time by their excessive acidity or alkalinity, seriously alter the conditions under which a filter normally performs its work.

In all such instances, however, it is apparent that special measures will have to be adopted for dealing with the sewage at the outfall works at such hours as the discharge from establishments of the kinds indicated arrives there. After all, essentially however, the problem of sewage disposal is one of dealing with the wastes from human habitations, which material may be said to consist of the following constituent parts, along with the mineral matters commonly reaching a sewer.

The analysis of the sewage of an average English town is given as follows:—

1. Solid matters in suspension:

(a) Organic.....	20	grains per gallon.
(b) Mineral.....	10	" "
Total.....	30	" "

2. Solid matters in solution:

(a) Organic.....	20	grains per gallon.
(b) Mineral.....	50	" "
Total.....	70	" "

Or expressed in parts per 1,000,000, such a sewage would yield:

Total solids.	Solids in suspension.	Chlorine.	Free ammonia.	Organic ammonia.
1428.0 parts.	428.0 parts.	120.0 parts.	50.0 parts.	10.0 parts.

It will be apparent that the solids in suspension may be quite readily removed in large measure by any crude filtering methods, which may obstruct their onward flow; but that the organic matters in solution must naturally require such treatment as will either obstruct their movement toward the stream toward which the sewage water will ultimately flow, or destroy them by altering them in chemical form will at once be apparent. Besides this there are soluble chemical salts such as the chlorides which are only with difficulty removed from sewage even if it be filtered through soil.

In addition however to the constituents of sewage already given there are microbes or micro-organisms, which are carried into sewage with the excreta of human beings, as either normally or abnormally present in the intestines, as well as various species from the sundry organic constituents of household refuse. In addition to these are, however, the very many other species naturally present in the soil and refuse of streets, lanes, and so on, all of which once carried into the sewers will multiply there, if there be no condition or substances present inimical to their existence as saprophytes. Besides these there are the various forms present in the air, which always occupies a notable part of the area of sewers.

It is therefore quite manifest that the mineral and dead organic matters in sewage, while forming its major part so far as bulk is concerned, may be, and indeed have in fact proved to be, the least important matter with which we are concerned from the public health standpoint. This is due to the facts, first, that the micro-organisms present in sewage may be in themselves pathogenic or actual producers of disease if taken into the human system either through air or water, and second, that such organisms whether disease germs or not may become saprophytes, growing and multiplying in sewage and there producing organic chemical substances which if taken into the system either through the air or water may prove to be actually toxic to the human or animal system.

The problem then of sewage disposal may be said to be simply: *How shall the organic matters present in sewage be so disposed of with the least cost, as that they shall not create effluvia nuisances either on the surface of the soil, along the banks of streams, or by their excessive presence in the waters of streams; or that they shall not pollute the water of streams which may be drunk either by man or animals with injury to health as the result?*

In order that such a question may be answered intelligently and correctly, it will be necessary to discuss the question of how pathogenic germs are removed from or destroyed in sewage, and of how the organic matters therein are by decomposition reduced to their simpler constituents, as either gases or soluble and insoluble chemical compounds. This process is what has very properly been called by W. D. Scott-Moncrieff, *The biolysis of sewage*, depending as it does principally upon the action of living organisms. He says, "*The problem may resolve itself into the discovery of the methods by which nature can be so aided in the case of sewage that it can be purified on the largest scale at a reasonable cost without creating a nuisance and without the use of chemicals.*"

The biolysis of barnyard manures applied to the ground as fertilizers affords the most familiar example of the destruction of the organic excreta of animals.

The following experiment (in a printed report of the chemist of the Dominion Experimental Farm) illustrates what takes place. He states that equal parts in weight of cow and horse dung were mixed and exposed to the amount of 8,000 pounds, in the open air in April. At the end of the month the manure had been reduced to 5,113 pounds. The organic matter was reduced from 1,938 to 1,093 lbs., or 45 per cent. of the total amount. The total nitrogen present, the total solids being but 30 per cent. of the total weight, was 48 lbs. or about 0.60 per cent. was reduced by 12 lbs. or 25 per cent. during this period. By this decomposition it is stated humus is formed, this being the name applied to semi-decomposed vegetable matter and is that which constitutes the black material in all fertile and productive soils. In a soil rich in humus it is found that micro-organisms are present in immense numbers per gramme of soil, decreasing downwards and that they carry on the decomposition of such organic matters as in virgin soils and manure until ultimately such would become but little more than mere carbon. It is thus seen that the multiplication of such organisms depends upon the presence of abundant organic matter and upon oxygen of the air.

We now know, however, that organic animal matters containing especially nitrogenous matters are capable of being decomposed apart from the presence of the oxygen of the air; in other words such materials may be broken up in water, after the dissolved oxygen has been exhausted by oxidizing processes and appropriated by aerobic organisms.

Mr. Thos. Fuller in his report on Water Purification states regarding the biological principles involved in sand filtration: "*This aspect is of practical significance by virtue of its action in removing organic matter which, in places beneath the upper surface accumulates as films around the sand grains. The removal of organic matter by oxidation and nitrification appears to be a factor in causing indirectly the death of bacteria, which are mechanically arrested by the adhesive action of the sand grains. By some it has been claimed that the bacteria go into a gelatinous form, the zoogloea stage; and being attached to the sand grains, they facilitate thereby the removal of bacteria in the active vegetable stage, and of minute suspended particles by means of adhesion.*" As to the

varieties of bacteria in sewage we may gain some idea from the fact that Fuller differentiated 27 distinct species of bacteria in the Ohio river water, which, if pumped, would subsequently pass into the sewers carrying in addition all additional micro-organisms picked up by the water in its manifold uses in a city. There were in addition 64 other microscopic species, including diatoms, fungi, infusoria, etc.

From this summary it will be evident that, given organic matter as food, and the many varieties of microscopic beings present in it, we have only to allow nature's vital processes to go on unchecked, favouring them further as we may in various ways, and we shall find that all or many of such organisms, as indicated, will, by their multiplication, feed upon the organic matters in sewage and thereby reduce it to its simpler elements. We may thus further understand how, for instance, quick lime added to sewage in quantity, being an active germicide, would be likely to notably retard such biolysis, while the creosote and carbolic acid products from the tar of gas works, the tannic and other acids from tanneries, with arsenic and other chemicals, might equally prove extremely fatal to these processes of purification of sewage by natural processes.

Assuming, however, that these various causes detrimental to biological processes are dealt with specially on the premises where they are created, it will be apparent that as no living organisms of any two species have exactly the same life processes that at various stages in the reduction of sewage to its simpler constituents the environment will become more favourable to the activity of this, then more favourable to the other organism. Such indeed has in practice been found to be the case, and the most recent practical methods for dealing with sewage by bacteriolysis or biolysis have been adopted with a view to favor successive series of biological processes by different micro-organisms. Mr. Scott-Moncreiff thus arranges the sequence of acts in the biolysis of sewage: (1) The process of purification by biolysis is not instantaneous but gradual. (2) Dividing it into any convenient number of stages or periods, each of these must represent a different character of food supply. (3) No one kind of organism is capable of flourishing in all the different media or stages equally well.

It must be apparent that given a knowledge of the several stages and of what normally takes place in them, much may be done either to accelerate, or to retard the work, or even reverse the natural order of biological processes. As we have long known in the filtration of water supplies, it has been a comparatively easy thing to remove suspended matters, but a very difficult thing to remove those in solution. Mr. Scott-Moncreiff now, however, makes the assertion *that the process of throwing organic matter into solution was even more easily carried out than that of getting rid of the suspended matters*—formerly removed mechanically and by the addition of precipitants.

He further states *that the question altogether hinges not upon the amount of the organic matter in solution, but upon its instability and susceptibility to further and rapid changes in the direction of complete mineralization.*

To illustrate his meaning we can best do so by referring to his experimental filter. He constructed a filter (see diagram) $2\frac{1}{2}$ feet wide, 10 feet long and 3 feet deep at deepest part. This received the entire sewage and wastes of a household of ten persons, excepting the grease, which is held back as far as possible by a grease trap. The liquid rises through a grating, and then through stones till it reaches an overflow pipe. The filtering materials are only 14 inches deep. He found in different installations of the apparatus that practically complete liquefaction of the organic matter could be obtained, and that the amount of sludge remaining amounted to almost nothing. It may be stated, as I have learned with a filtration tank operating now for ten years, that the same decomposition of organic matters is effected in a covered tank, with the overflow pipe draining off the fluids half-way down in the tank. At the end of the year the sludge remaining does not amount to over a few pounds, grease, paper and other vegetable fibres being broken up almost equally with the sewage. The final disposition of this liquid sewage in this case has been by sub-surface tiles. Mr. Scott-Moncreiff pushed his experiments to determine how rapidly and most simply the further decomposition of this material could be carried out. He found

DIAGRAM ILLUSTRATING EXPERIMENTAL TANK OF W. D. SCOTT-MONCRIEFF.

FIG. 1

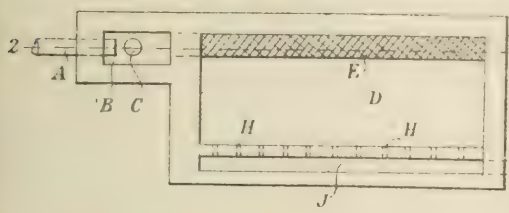


FIG. 4

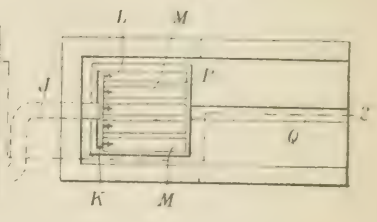


FIG 2

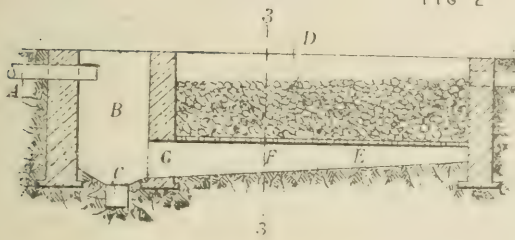


FIG 5

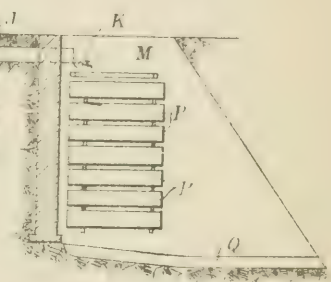


FIG 3

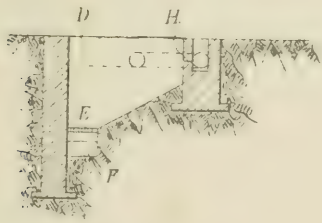
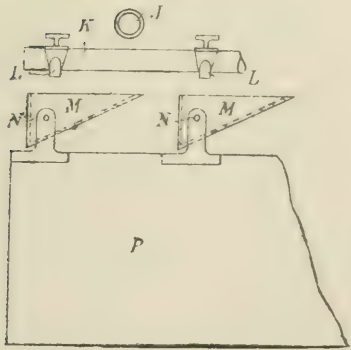


FIG 6



when this effluent went into a stream that while with the chlorine constituent as a measure of dilution, the latter was as 3 to 1, the loss of albumenoid ammonia was as 7 to 1, or in other words was very rapidly oxidized in the stream.

What was apparent then was that so far the oxygen in the water had first been utilized by organisms in the oxidizing process in the sewer before the sewage reached the tank and that afterwards other anaerobic organisms continued the work, utilizing all the combined oxygen of the organic matter itself. Mr. Scott-Moncrieff thereafter devoted himself to determining conditions most favorable for pushing the process of decomposition of nitrogenous matter still further. To this end a series of nine boxes, each filled with coke (inch size) to a depth of 6 inches, was arranged one above the other, and by an automatic tip tank the top received sewage pumped from the tank which passed successively through the nine boxes 6 inches apart. From under each a series of test samples could be taken at any time. The apparatus was kept constantly working for the three months to test the tendency to clogging of the coke. With the effluent running at the rate of a little more than 1,000,000 gallons per acre analyses were made by Dr. Rideal. The table of results is most remarkable as illustrating the same process which went on in the disintegration of barnyard manure, in other words the oxidization of nitrogenous products as seen in reduction of nitrous nitrogen from 0.99 in first tray to none in trays 10, 11 and 12 and of the increase of nitrates from 0.096 in first tray to 9.0 in tray 12. This remarkable conversion of products occurred in rather less than ten minutes showing the marvelous rapidity of the process.

Now by transposing the trays so as to upset the natural survival of the organisms in the different trays in the sequence, the whole process was arrested, a high colored and inferior effluent being the immediate result, and one or two days were required to re-establish the condition which had been disturbed.

Such then are the experimental results involved in sewage precipitation. As regards these results from the chemical standpoint there have been really two steps, first the attacking of the organic matter alone and second the breaking down of the ammoniacal nitrogen formed, it being changed finally into nitrates by oxidization.

Prof. W. E. Adeney, Royal University of Ireland, calls the two stages, those respectively of carbon-oxidation and nitrogenous-oxidation, and finds that the first stage is complete before the commencement of the second. From this it would appear that the stages of the process are the same in the purification of sewage whether or not the aerobic treatment takes place in the same filter where anaerobic action goes on or in a filter after the previous anaerobic process in a closed tank as that described by Mr. Scott-Moncrieff and now commonly called the septic putrefaction tank. Remembering, however the presence of oxygen in a natural water and that the air of properly ventilated sewers contains it in abundance it will be apparent that the aerobic stage is necessarily present in sewers before the sewage has reached the sewage works at the outfall.

The application of the septic tank principle to the purification of sewage on a large scale as at Exeter, England, is that illustrated by the diagram of the Scott-Moncrieff tank wherein the entire sewage is submitted in an air free dark space to the liquefying action of aerobic bacteria, a process daily seen in the laboratory test tube when gelatine culture media are liquified by microbes beneath the surface. Indeed Dr. Sims Woodhead has found that in 1 c.c. of Exeter crude sewage there were one million organisms which were anaerobic and five and a half millions which were aerobic. Of the 1,000,000 anaerobics 300,000 were found to be liquefying organisms and of the five and a half aerobics 500,000 were liquefying. From these, as may readily be seen in the laboratory, are given off carbonic acid, ammonia and other volatile gases. The Exeter septic tank has never been cleaned out, yet rags, paper, straw, feathers are gradually liquefied. Chemists have indeed found and named special ferments which attack and destroy cellulose both in the intestines of animals and in laboratory experiments. Further we have the specific microbe termed *B. amylobacter* always found in putrefying processes and attacking or hydrolysing sugars, starches and cellulose and producing as by-products butyric acid and hydrogen and is essentially anaerobic. The chemist, Mr. S. Rideal, London, has

Table showing successive stages of Mineralization by Nitrifying Organisms. Ashstead Experiments, February, 1898.
By W. D. Scott Moncrieff.

Description of samples.	Colonies of Aerobic Nitrifying Organisms.													
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	Chlorine.	Free NH_3 .	= N.	Albuminoid NH_3 .	= N.	Oxygen consumed.	O. consumed minus O. required by Nitrous Nitrogen.	Nitrous Nitrogen.	= Oxygen required.	Nitric Nitrogen.	= Useful O_2 to N_2O .	Total Oxidised Nitrogen.	Available Oxygen used = O. Nitrate consumed.	Total Urea-dissolved N. (Kjeldahl).
	Total Organic Nitrogen.	Total Inorganic Nitrogen.												
	Total Nitrogen of all kinds.													
1. Effluent from cultivation tank, taken 3 and 5 p.m.	9.0	12.5	10.30	1.50	1.23	9.843	9.843	Nil	...	0.12	0.274	0.12	-	12.35
2. Effluent from first tray.	9.0	10.5	8.65	1.25	1.03	6.694	5.56	0.99	1.13	0.096	0.219	1.036	-	11.5
3. Effluent from second tray.	8.5	9.0	7.42	1.00	0.82	5.773	4.74	0.90	1.03	0.48	1.09	1.38	-	11.10
4. Effluent from third tray.	8.5	5.0	4.12	0.66	0.49	4.493	3.60	0.78	0.59	1.87	4.27	2.65	-	6.60
5. Effluent from fourth tray.	8.0	4.0	3.3	0.35	0.29	1.728	0.98	0.66	0.75	2.76	6.30	3.42	+	5.15
6. Effluent from fifth tray.	7.75	1.5	1.24	0.15	0.12	1.28	0.73	0.48	0.55	4.68	10.70	5.16	+	1.75
7. Effluent from sixth tray.	8.0	1.75	1.44	0.35	0.29	1.497	0.92	0.51	0.58	4.416	10.10	4.926	+	2.25
8. Effluent from seventh tray.	7.5	0.35	0.29	0.30	0.25	0.755	0.755	Nil	.....	6.6	15.08	6.6	+	0.85
9. Effluent from eighth tray.	7.5	0.20	0.165	0.65	0.53	0.397	0.397	Nil	.....	7.32	16.73	7.32	+	1.03
10. Effluent from ninth tray.	7.5	0.25	0.206	0.60	0.49	0.589	0.589	Slight trace.	.....	9.0	20.0	9.0	+	0.60

found that 2 to 3 parts of organic carbon in 100,000 parts of sewage are daily oxidized in the Exeter septic tank and removed in solution as carbonic acid as well as being given off into the air of the tank. Again Mr. Rideal points out, in the septic filters installed by Mr. Dibdin, where the sewage is pumped directly on to coarse burnt ballast of four feet in depth and allowed to stand two hours, to be thereafter drawn rapidly and completely off, its place in the pores of the filter being immediately filled with air to complete the disintegrating process by aerobic action, that the primary stage of *resting fluid* of sewage is an essentially anaerobic or septic stage. It will be apparent that there is equally the condition in the process of ordinary sand filtration of water. We may state then in general terms that any form of rough filtration removes a notable amount of suspended sewage matters amounting, according to Rideal, to about one-third of the organic nitrogen and one-half the carbonaceous matter of the sewage. The Massachusetts experiments as also those of Mr. Scott-Moncrieff point out that such rough filtration even at a very rapid rate as over 1,000,000 gallons per acre in practice removes a small amount of the soluble organic matters. The extended Massachusetts experiments further point out that such rapid filtration effectually removes germicides such as the soluble salts of arsenic formed by adding lime to sulphite of arsenic utilized in certain tanning processes, by the formation of a double insoluble salt of iron and arsenic, thereafter allowing the purification of the sewage to go on naturally by the processes of fermentation through carbon oxidization and nitrogen oxidization.

Summing up then the processes which the sewage of any town would be subjected to, according to what is now known of its treatment, whether mechanical, biological, or chemical, we would have

1. An initial aeration as in water and in the sewers, causing the production of a certain small amount of nitrogen, as free ammonia, to be present.
- 2 For the treatment especially of sewage including industrial wastes, and inorganic refuse as clay and sand, a rapid filtration through a bed of coke or coal, moderately fine over coarse, the upper layer of which can be readily removed and burned, the filter working at the rate of 1,000,000 gallons per acre daily, for a considerable time without clogging, or if the sand and clay have been in large part removed by previous sedimentation, at the rate, according to the late Col. Waring's experiments at Newport of 3,000,000 gallons daily per acre. The process in both cases removes from forty to fifty-four per cent. of albumenoid ammonia in the sewage.
3. The passing of the sewage upward through a second coarse coke filter, which may be termed the septic tank, or the alternative method of allowing the sewage to rest on a coke filter for several hours before draining it off.
4. The final passage of the sewage over a sand filter, a coke bed or to a sewage farm, where by aerobic fermentation the final reduction of organic nitrogen, as soluble free and albumenoid ammonia will take place by nitrosification and final nitrification

*We have seen in the table given in connection with Mr. Scott-Moncrieff's septic tank experiments the amounts of organic nitrogen in the effluent from the septic tank, and the nitrites and the nitrates after filtration through the successive coke filter trays; but the following analysis is of sewage taken January 3rd, 1898, from the Exeter works :

Analyses of Raw Sewage and Tank Effluent.

	Total solids.	Parts per 100,000.			Nitres.	Chlorine.
		Free ammonia.	Albumenoid ammonia.	Nitrites.	Nitrogen as nitrates and nitrites.	
Sewage, 4.45 p.m.	63.0	1.60	0.48	Nil	Nil	5.6
Septic tank effluent, 4.40 p.m.	65.6	4.00	0.25	Trace	0.13	6.3
Filtrate, filters 1 and three, three hours after discharge.	65.2	0.185	0.09	Nil	2.00	5.6
Filtrate, filter 4, five minutes after discharge.	62.5	0.20	0.09	Nil	2.00	5.5

* See Table, page xxxiii.
xxxiv.

Having thus in the several paragraphs dealt with the principles involved in sewage purification the question will always arise with our municipalities and their officers as to the practical methods by which such principles can be carried out. If we were to sum them after our own observation and study it would seem that the following conclusions are justified in practice:

1st. Reduce the town sewage to be treated to a minimum (a) By the metering of the household supply of public water; (b) By the introduction of the separate system of sewers; (c) By the laying of open tiles in the same trench but at a little lower level than the sewer for dealing with ground water.

2nd. Lay all pipes on best gradients possible and thereby conduct sewage to its outfall as rapidly as possible.

3rd. In all cases where street wash, as in combined systems, is allowed to reach the sewers, have street catch basins, also have conical bottomed tanks at end of outfall sewer to catch the sand and other mineral or heavy deposits.

3rd. Have sewers laid with a view to discharging the sewage, with the least possible amount of pumping.

4th. In all cases conduct sewage into a tank at outfall capable of holding the greater part of a day's supply of sewage, this tank being in fact a septic tank of coarse coke, arranged preferably as a pair, the sewage discharging either on to the coke or from below upward. By the alternate tank and surface discharge the removal of the surface layer of coke is readily accomplished.

5th. The passage of the effluent from the septic tank preferably, if possible, to a sewage farm, where the utilization of the nitrogen compounds would produce the highest economic results without any possibility of a nuisance. This latter method is exactly that adopted ten years ago by Col. Waring in the disposal of the 75,000 gallons of sewage of the London Asylum with its 1,200 inmates. It is simply the collection of the sewage from all the buildings into a covered brick tank, whence the sewage is pumped daily a quarter of a mile and there distributed by the flat bed system in ditches to a porous sandy soil, and from which the water is rapidly utilized in watering the vegetables in the intervening flat beds. The value of these crops in the area of a four acre farm is estimated at least \$200 per acre.

6th. When owing to the price of land or its impermeable character this method is not wholly available, the final nitrification of the sewage from the septic tank will best be completed by a series of coke or sand filters through which the sewage will be allowed to pass slowly and intermittently, the tanks being used in succession.

We have very briefly summarized what seem to be the main biological facts involved in the complex problem in the dissociation of the organic compounds contained in sewage, and the natural processes by which such materials are reduced to simple compounds in what has been called by Professor G. Sims Woodhead, the mineralization of organic matter. He thus expresses himself:—

“It would appear in fact as though there were developed special organisms for the setting up of special fermentations, and also after the breaking down has been carried a certain length by one organism, the aid of another is invoked to complete the process more thoroughly and more expeditiously. We have in this, as in the case of the process of digestion, an exemplification of the fact that nature economizes her resources as much as possible; she does not call on the animal cells of the alimentary tract to do the work that can be equally well done by micro-organisms, nor does she demand the exercise of more than one or two functions from each of the protoplasmic specks that we call bacteria. To each one is assigned its special work, and though it is possible that many of them started with certain powers in common, it seems that through the exercise of some of those common powers under special conditions they have become differentiated functionally, that, as amongst organisms more highly developed, each is able to carry on its own work best at those special stages of the putrefactive process at which it is found. It might at first sight appear that all this can have but little bearing on all practical work in which we are engaged, or in which we take an interest, but on more careful consideration it will be found that these putrefactive organisms really keep up the circulation of matter, utilizing the excretions of living beings and the carcasses of dead animals and plants, after

breaking them down into their simplest constituents, to supply those elements that are necessary for the nutrition of plants, allowing them to present themselves in their most assimilable forms, and in the proportion most suitable for the nutrition of the growing, highly organized vegetable protoplasm. Bacteria in fact serve to transform inert organic matter into organic substances. This transformation or 'mineralization' in most cases commences when protoplasm has lost its vitality, and most micro-organisms are capable of attacking this dead protoplasm only; though, as we shall find later a certain number of bacteria have acquired the faculty of being able to attack even living protoplasm. The process of decomposition may be divided into two kinds: first, those going on as the activity of organisms that are capable of taking up their oxygen from the air, and, second, those the result of the activity of organisms that so break up and re-arrange the organic molecules containing oxygen, that not only do they, the bacteria, take up oxygen themselves, but they allow of its being handed on to the product, to which in their processes of metabolism they give rise. It is probable that here we have to do, not only with nascent oxygen, but that we have certain products set free during the process of decomposition which seizes upon oxygen with very great avidity. This decomposition or re-arrangement is spoken of as a process of nitrification or a conversion of the nitrogenous elements into ammonia, nitrous and nitric acids, carbonic acid and water, or speaking more generally, it may be said to be a process of mineralization of the organic forms of nitrogen, phosphorus, carbon and hydrogen, during which they become finally oxydised or mineralized to nitric acid (HNO_3), phosphoric acid (H_3PO_4), carbonic acid (CO_2), and water (H_2O). In nature this process goes on in the superficial layers of the earth or in the presence of the atmosphere. That it takes place much more readily near the surface of the ground and in porous earth can easily be understood, if what takes place in the oxidation that goes on in spongy platinum is borne in mind."

So much appears in this problem viewed wholly from the sanitary standpoint; but it cannot be supposed that any natural processes involving the mineralization or reduction to a condition available for plant food of the enormous amounts of organic wastes from human populations can be accomplished without involving other scientific and sociological principles. This is illustrated by the fact that, dealing only with a single country, the population of England imports annually about 120,000,000 bushels of wheat, or to take the problem of Sir William Crooks in his presidential address before the British Association for the Advancement of Science, in 1898, he has stated that the "bread eaters of the world have increased from 371,000,000 in 1871, to 516,500,000 in 1898," and has calculated that in order to give each an average daily amount of food 2,324,000,000 bushels annually are required. This remarkable advance in the amount of food supply required is illustrated from the further standpoint, that the population in 1891 of 68 towns in Germany, England and France, together included 21,050,000, while in 1840 there were but 4,800,000 persons living under similar conditions. A recent writer regarding trade and commerce, has made the further remark that the industrial population to which Manchester is the importing and distributing centre alone amounts to some 10,000,000. It is hardly necessary with such facts before us, to point out that since the equivalent of every bushel of wheat is represented in the sewage wastes of our cities and towns by a definite amount of organic nitrogen, the problem is a serious one as to how long the indiscriminate destruction and waste of this natural food for plants, and especially for the wheat crop, by allowing the sewage to be poured into the streams, can go on, before there will be a natural scarcity of that nitrogen upon which the success of the wheat crop most intimately depends. This matter has been dealt with recently by Sir William Thompson, Lord Kelvin, in which he has pointed out the startling fact that the United Kingdom sends annually to the sea nitrogen to the value of no less than £16,000,000 sterling.

Professor Crooks further points out that the sources of artificial fertilizers, such as nitrate of soda and guano, are rapidly becoming exhausted. And he states, further, that while the storing of nitrogen in the atmosphere is practically unlimited, it is, nevertheless, rendered fixed and assimilable only by cosmic processes of extreme slowness. "The nitrogen which with a light heart we liberate in a battleship broadside, has taken millions of minute organisms patiently working for centuries to win from the atmosphere." He then refers to the question of what other sources we have to look to in order to obtain the nitrogen without which the growth of the food of man becomes an impossibility; and then refers to experiments by which it is made apparent that electrical oxidation of the nitrogen of the air is likely sooner or later to become a commercial source of supply of artificial fertilizers for the growth and development of our food supplies.

These references to the discussion of such important problems by two of the greatest of the world's physicists is enough to cause us to carefully study the conditions prevailing in Canada in order that we may at any rate limit by prompt action the mistakes already made and which have become so serious in the older countries of Europe and Asia. We must fully realize that there is not only a unity of purpose in nature's processes, but also that all the forces of nature have an intimate relationship with one another, and that as all forms of animal and vegetable life are dependent upon inorganic life, so inorganic matters are again reproduced by the disorganizing, dissciating processes of plants and animals. We have already seen that the amounts of organic wastes from any given population, calculated as to their value from a fertilizing standpoint, can be accurately estimated, and that there is only the problem remaining of the invention of mechanical methods by which biological processes can be made available in a commercial manner by turning such wastes back again into plant foods. As already stated in the beginning of this chapter, the problem has scarcely been touched in Canada, but necessity therefore has hardly been realized, and the municipal methods have been hitherto much too crude to enable any municipality to adopt comprehensive measures for successfully carrying out from the commercial standpoint nature's plans for the turning of the organic wastes of town sewage into artificial fertilizers. What can be done has been well illustrated in certain places in England, and still better at Paris and at Berlin. We have too in Ontario one illustration of how sewage may become an actual source of agricultural wealth, viz., that of the sewage farm at the London Asylum; but as yet it is but a beginning.

The city populations have not yet been great enough, and the diluting powers of our lakes and rivers have been too large to heretofore force problems, such as the conservation of the wealth contained in the nitrogen of sewage, upon the attention of our people. The city now only thinks of getting rid of those wastes at a minimum of inconvenience and cost to itself, regardless largely of whether it does a material or vital injury to its neighbor. The agriculturist has too inadequate an idea of the loss he yearly sustains through the removal of nitrogen products from his farm, as straw and hay, to seriously question whether the sewage of towns has any settled relation to his commercial success. Under such circumstances, it is quite clear that the notable evolution of scientific thought is necessary amongst our people before they can realize that the producer and consumer of foods have commercial relations quite as intimate as are either their political or social relations, and we have yet to learn and put in practice the truth contained in that very ancient story of Roman history in which Menenius Agrippa convinced the common people at the Sacred Mount how intimate was the relationship between the ruling class or the patricians, and the common people or plebs, by the memorable fable of "The Belly and the Members."

As however, the nineteenth century has seen made year after year discoveries each seeming to surpass the other, so we have every reason to believe that the scientific evolution of the twentieth century will be adequate for the social needs of generations to be. With the powers given under public health laws in Ontario we only require the steady advance of public opinion through education, and an increasing realization of the belief that each unit of society influences definitely the well being of all others to see a balance more than maintained of the constructive over the disintegrating forces which affect society at large. Such a belief is that given expression to in the closing words of the late Sir John Simon in an address on "Experiment as a Basis of Preventive Medicine." He said: To the science of nature, indeed, is allotted that one incomparable human day which knows no sunset. In the fierce light of its everlasting daybreak individual workers will pass away, generations will change; but the studies of nature and above all, the gathering of such knowledge as can lessen man's physical difficulties and sufferings will surely grow from age to age, and, as in Proserpina's sacred tree, one golden fruit will follow another:—*Simili frondescet virga metallo!* Such were the enthusiastic words full of faith not only in the future of Preventive Medicine, but in the happiness which would accrue therefrom to men, spoken (in 1881) by the great leader of Preventive Medicine. And yet, reviewing the situation at the end of the century, we are forced in the words of Dante to say:—

"There is no light that comes from the Serene
That never is o'ercast."

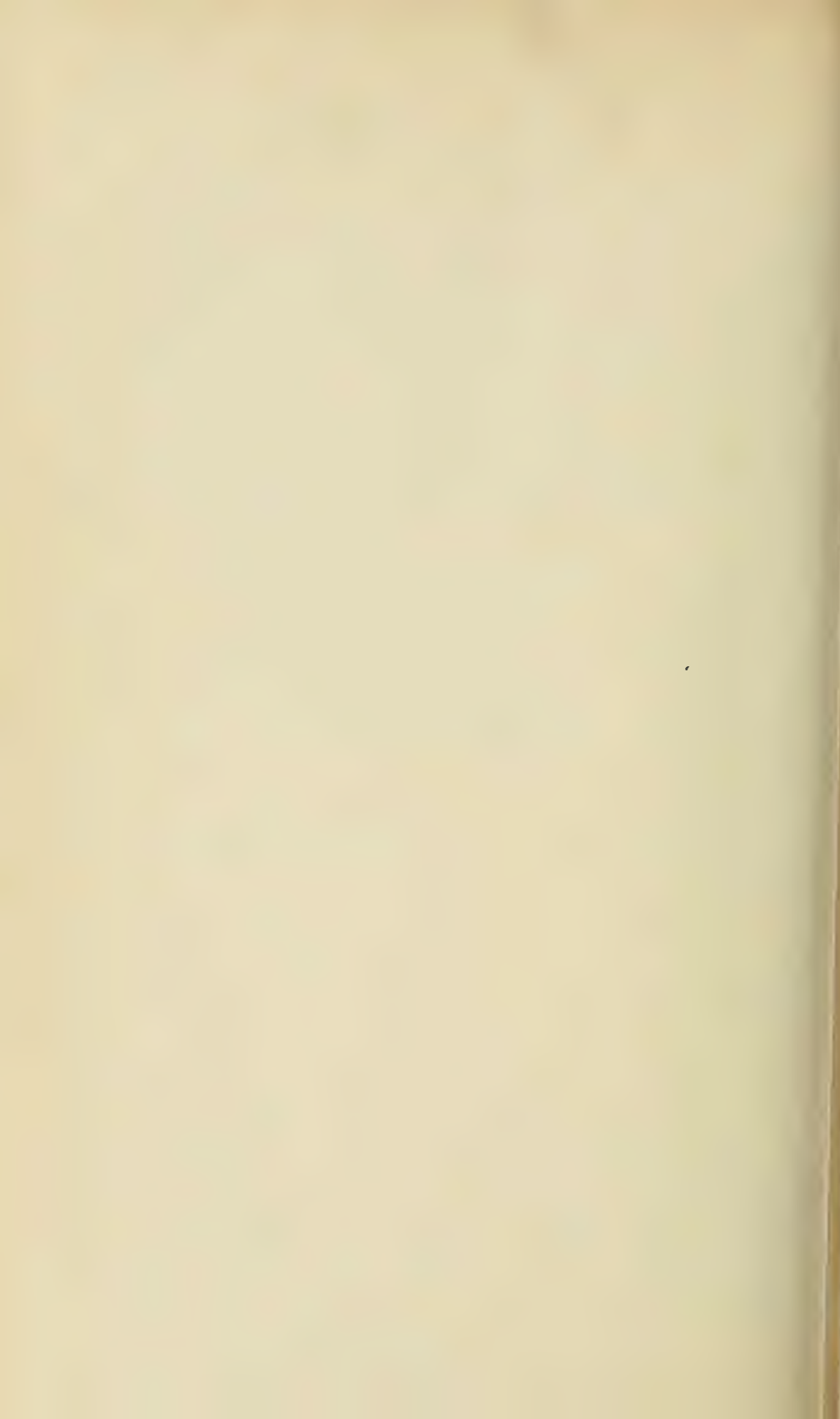
Self interest, ignorance and prejudice have delayed, and will still prolong the struggle of man upward to the light; but in the words of Dr. Crozier:—"The scientific spirit is already a potent one, and is daily exercising more and more influence over the most intelligent and cultured minds." Philosophers of all ages and in many lands have seemed to see in the near future the realization of their dream when as with Buddha evil would be banished and the higher nature would be supreme at every point where man would "stand like a pillar of the city gates unmoved, like the broad expanse of earth unveiled, or like the pellucid lake unruffled." But the dream is far yet from being fulfilled; and nowhere is it more frequently or more painfully forced upon us than while endeavoring to obtain some comprehensive idea of the manifold influences affecting man unfavorably in regard to his physical environment, and through this his whole intellectual and moral nature. While it may be quite true that man knows better than he does, yet the fact stands, that he would require "a complete and perfect knowledge of physical, mental, moral and social laws," were he to be able to banish all the ills which flesh is heir to, and which we have already amply illustrated is far from his present position. And yet it is sufficient to urge us onward in the work that lies before us to believe and remember the immortal words of Tennyson:—

"A soul shall draw from out the vast
And strike his being into bounds
And moved thro' life of lower phase
Result in man, be born and think,
And act and love, a closer link
Betwixt us and the crowning race.
Of those that eye to eye, shall look
On knowledge; under whose command
Is earth and earth's, and in her hand
Is nature like an open book."

Respectfully submitted,

P. H. BRYCE, M.A., M.D.,
Secretary

PART II.



CHAIRMAN'S ANNUAL ADDRESS.

By J. D. Macdonald, M.D., Hamilton.

TORONTO, January 30th, 1899.

GENTLEMEN,—It is, I think, my duty, and if it be not my duty it is my impulse, to give expression to my satisfaction at our meeting here again at this time to begin the work of another year and that all our associates are in the enjoyment of good health and ready to perform the functions looked for from them as members of the "Provincial Board of Health." It is not unusual to speak of transactions such as we are to engage in as "labours." I do not use that term in connection with them. They are of so much interest to us all, that I am persuaded it would not be truly descriptive if they were thus distinguished.

It was at one time thought, on the part of some, that this meeting would not consist of the same members constituting it hitherto or at least for some years past. It is I think proper for us to say that we think it to be well that no change, such as may have been expected, has taken place. The duties of the Board are such as to make it desirable that one of its characteristics should be its continuity, such changes as take place in its membership not involving all those who composed it at the same time.

In opening our meeting for the year, it is a pleasure for us to say that the health of the country has been good during the year which has passed. No epidemic has appeared, nor have infectious diseases obtained a footing in the land. Some of the latter kind have appeared, as appear they will from time to time, but whenever such have caused alarm so as to cause that they be reported here they have been promptly suppressed by measures directed by the active secretary of the Board. Diseases of that nature are seen tabulated in the monthly reports, but the cases have not been so numerous as to enable us to say that they have had any prevalence. Hitherto however an exception should be made with respect to our old enemy tuberculosis. It is always present, a persistent life destroyer, and during the year past has been true to its history. It has cost the country more lives than all the other diseases reported when added together.

Tuberculosis hitherto has been less influenced in its prevalence by endeavors at prevention than all others of the infectious maladies. To the mind of the medical profession its continued virulence is due to the chronicity of the disease and hence to the difficulty in the use of such means towards checking its diffusion as are serviceable in other infectious maladies whose course is shorter. It is not altogether too strong language if we say that the profession is in a vexed state because of the difficulty of bringing about some degree of suppression of this malady, and that not because the difficulty is insuperable, but because so far society has not come to look on the necessary means with favour. The means are regarded as too severe and as being to "the many" altogether unpracticable.

Notice is before us, for discussion to-day, on the part of our confrere Dr. Cassidy, of a paper whose purport it is that the Board declares phthisis to be a notifiable disease. Placarding a house is spoken of by the laity with impatience. Most of us are aware that this is a thing to be desired. We have discussed the matter with the profession and with our friends outside of it, and the result has always hitherto been that the project has been dismissed as being one which would not be tolerated. To keep a house quarantined and denied social intercourse for a year or two as it might be, would seem a severe infliction, and it is more than doubtful if either the inmates or their friends and neighbours would give attention to the warning left by the health officer. Very many consumptives continue breadwinners for years. For such the inhibition placed upon the door would be a hardship, and would be regarded as an unreasonable interference with the duty of earning the daily bread of the family. Some of us who have discussed this expedient for the prevention of disease with our friends and acquaintances have had the matter presented to us in the light just adverted to and that with some touch of indignation as if the measure was high handed. Upon the whole it would seem that much time will be needed to reconcile the majority to such a decision on the part of the Board of Health.

The other mode of separation of the tubercular from the healthy, to wit, that by means of consumption hospitals or homes, meets with less objection. It seems acceptable, especially to those whose worldly circumstances are comfortable and who expect to pay for their residence and treatment in those institutions. No one says anything unfavorable of them, and as is well known they are very generally taken advantage of. Those accepting the benefit of them are the comfortable classes, and where pecuniary conditions permit they are most beneficial institutions. If it were possible to get the labouring classes accommodated in such the problem of the prevention of phthisis would be nearer its solution. In the meantime, however, the larger number of those affected with phthisis are necessarily excluded from them, and will continue to be, unless the providing of the hospitals be undertaken at the public expense, whether on the part of the Governments of the Provinces, or of the municipalities.

It seems to be believed by many whose opinions are of value, that a principal agent in initiating tuberculosis in the human subject, is the bovine family. Perhaps if that family had been able to entertain and express an opinion, we might be given to understand that the course of things was, probably, at least often, the reverse. But there can be little doubt the treatment of cattle, the habits of life imposed upon them, is very favourable to the lodgement and increase of the bacillus of tuberculosis in and among their tissues. It is very likely that many a family, both in town and country, when phthisis breaks in upon them need not have to look farther than their cattle stables when they ask for the source of the plague which has cost them so dear. The evil here adverted to, it has to be admitted, is not overlooked by health authorities, but there can be no harm in impressing upon the owners of cattle, both for the sake of their own health and of that of others, that they be particular about the cleanliness and free aeration of their premises, and that health authorities throughout the country be frequently exhorted to increase their watchfulness over the district committed to their supervision. For the rest, much may be trusted to the gradual growth in the public mind of the necessity of consenting to measures for the restriction of consumption which may seem to them now to be excessive. The general acquaintance with the nature of the disease has increased much within the memory of some of us, and no doubt will grow more towards perfection.

AN ARGUMENT FOR THE APPOINTMENT OF COUNTY HEALTH OFFICERS.

Quarterly Report of the Secretary.

TORONTO, April 19th, 1898.

To the Chairman and Members of the Provincial Board of Health :

GENTLEMEN,—Inasmuch as the Act establishing Local Boards of Health in Ontario has been in operation for fourteen years, it has appeared to your Secretary proper to present for your consideration the results of his experience in the operation of the Act in effecting the objects for which it was established, as well as some statistics gathered from a circular sent out to Medical Health Officers, dated February 15th, 1898.

It will be remembered that up to 1884 there were only a few health committees of municipal councils in existence, and that before that time whatever public health work was done was rather of an accidental character, as when some outbreak of small-pox demanded special attention. Since 1884 public health work has been by law relegated to local boards of health, formed of ratepayers, who might or might not be members of council. Up to 1895 many of such boards were composed largely of the members of the council, but I find in the answers to the circular that owing to the amendment to the Act in that year making the term of office three years for the appointed members, boards are

now generally composed of the ex-officio members (the reeve and clerk of the Council) and ratepayers who are non-members. This is reported to be the case in 169 of the 285 replies received.

There is evidence to show that this result has served to make the Local Boards more independent in their actions than formerly, but that their operations are still in most instances of a very limited character is shown by the replies stating that in very few instances, comparatively, is any grant placed in the estimates of the Municipal council at the beginning of the year for public health work.

Thus from 285 replies it is stated that 16 boards in cities, towns and villages have grants to the amount of \$51,374.00, more than half this amount being for the city of Toronto; and that 13 boards in townships have an amount set apart equal to \$560.00. Speaking generally the answers state that the boards send in their accounts to the Council, which are not always passed, at least without serious discussion.

That the amount that is expended, except in the case of the larger cities, is insignificant may be gathered from the tables following. With regard to these amounts for public health work it is, however, of further interest to note the replies made to the question as to whether members of the Local Boards receive any allowance for meetings of the board. From 285 replies it is found that in accordance with the practice as regards the Council no payment is made to members of city and town boards; but as regards township boards it will be seen that 106 out of 243 boards receive a per diem allowance for attending meetings of from \$1 50 to \$3.00, with, in some instances, mileage. These amounts are not included in the amount stated in the instances given as being set apart for the work of the year.

In connection with this allowance to members of the board the answers to the question as to what amounts are paid and how to the medical health officers of the boards may be noted. From the 479 medical health officers appointed for 1898, 285 answers were received. These answers are summarized in appended tables.

Under the Act, however, provision is made for the appointment of sanitary inspectors. According to the returns of boards organized in 1898, 150 sanitary inspectors were appointed. Replies regarding these appointments and salaries were made from 285 boards. The answers summarized give the results seen in the tables.

Such then, so far as statistics are available, are the results of fifteen years' evolution of public health work in Ontario. It must be remembered that there are some 745 organized municipalities including those in the Territorial Districts, most of these latter, however, having populations averaging probably 500.

For 1898, 568 boards have been reported as having been appointed by the Councils. Of these reported, 479 have medical health officers appointed, and 150 have sanitary inspectors. Of the replies made to the circular 204 or 71 per cent. state that the medical health officers are appointed annually, and 28 or 10 per cent. during the pleasure of the Council. Of the same number reporting, 70 per cent. of the sanitary inspectors are appointed annually, and 10 per cent. as per reports during pleasure or permanently. Of the boards appointed, 40 per cent. in townships pay a per diem allowance to members of boards, 60 per cent. pay nothing.

Of the medical health officers, 30 per cent. receive an annual salary, 60 per cent. are paid only for such specific work as they are asked by the Council or Local Board to perform, and 2.0 per cent. receive nothing, except as remarked by some, "glory."

While we must remember that the Public Health Act has been in operation but 15 years, while it cannot be forgotten that public health work everywhere has practically a history of but half a century, and that in Ontario a very notable number of municipalities have been organized within this period, yet it must be confessed that the results so far as the organization of an effective and systematized public health system in the Province is concerned are somewhat disappointing, though not discouraging. They are not discouraging for the following reasons:—

1st. That the work was 15 years ago, one whose needs and aims were unknown practically to the great body of the people. The mass of the people thought disease had to be, and that they should endure it with resignation.

2nd. That to-day a very general public opinion has been developed, to the effect that a notable number of our most fatal diseases are communicable by contagion from person to person; that others depend directly on insanitary conditions as polluted water, and wrong sewage disposal and that therefore both are preventable.

3rd. That private and personal interests in matters of health must be made secondary to the greater public good.

4th. That daily from every direction, we have evidences that the people generally show a remarkable willingness to obey the laws for promoting the public health, often to their own personal or family inconvenience.

5th. That constantly from private persons and from officers and members of health boards, appeals are made to your Board, and local authorities for the enforcement of law.

6th. That the Legislature and Municipal councils have made abundant provisions by specific enactments for dealing with almost every kind of insanitary condition.

Wherein, therefore, would seem to be found the reasons for results, which it must be confessed are disappointing?

I do not propose to enter upon a discussion of the merits and demerits of our system of municipal government, but shall refer briefly to such points as bear upon the subject in hand. Much has been said for and against the powers given to school authorities to demand such amounts of municipal moneys as they deem requisite for maintaining and promoting educational progress. Since trustees are elected by the people, they would seem to be as directly responsible as members of the Councils for the expenditure of public funds. As Local Boards of Health are appointed and not elected, it may fairly be argued that they should not at will have the power to make expenditures for which they are not directly answerable to the people. Inasmuch, however, as they are required to perform certain duties positively laid upon them by the Public Health Act, it is apparent that where the Councils fail to make grants, the work must either be left undone, or the board must have a right to call upon the treasurer to honour their bills. Such indeed is actually the law; and it might be assumed that Local boards would take advantage of their powers. As a matter of fact however, as we have seen from the returns, Local boards have so tied up in their membership with members of the Council, that they have but seldom realized and asserted their rights and powers.

This same neglect to exercise legal rights and duties has operated yet more in the case of medical officers. Though the Public Health Act distinctly empowers and requires such officers to perform many of the same duties, which are required of Local boards, whether or not the latter order the same to be done, yet by an anomaly of the Act, the medical health officer is an appointee of the Municipal council, and as we have seen is practically always appointed annually. It is plain therefore and has proved almost invariably true in practice, that any medical health officer who has actually attempted to carry out the duties he is called upon to perform by virtue of his appointment has antagonized the Local board, which, in practice, seems to think that it has the sole right to determine what a medical officer ought or ought not to do. Should such an officer, however, attempt to do thorough work, and be supported by the Local board, he will soon find that since he is the appointee of the Council, they will see that he shall not a second year incur expense in carrying out the plain intention of the Act. They have, however, insured that such an officer will not prove too active by limiting his salary, if indeed he receive any at all, to such an insignificant sum, that no medical officer for the amount paid is likely to make himself antagonistic to the Council and make himself unpopular with the people amongst whom he practices. Just imagine such an officer seriously attempting for the \$5.00, \$10.00, or \$25.00, the average annual salaries in all but the towns and cities, to do public health work, oftentimes thereby creating misunderstandings

with his fellow practioners, and offending those (who may violate the law) and yet may be or are his patients.

The experience of fifteen years has abundantly illustrated the fact, that while the Local boards are in a position to do good work, the method of appointment, the tenure of office, and the salary or fees paid, make the position of the medical health officer an anomaly and absurdity. We except, of course, the large cities, where a certain importance and dignity are attached to the office, because of the extent and urgency of the work, and because the salary is at times enough to cause an officer to give himself loyally to the work.

The position of a medical health officer of a township is especially an anomaly, for there we see five members of a board of health holding from six to twelve meetings annually, at a cost of usually \$10.00 a meeting, often with mileage, or say \$100.00 a year, and who, when in their wisdom they think it convenient, call in the medical health officer, generally to do some disagreeable work they do not wish to touch themselves, and then offer him a fee, perhaps not greater than each of themselves receives for sitting upon the case.

There are two other good reasons why the present system cannot progress. First, because sanitary work is largely scientific work, and members of Local Boards of Health do not understand how to effectively deal with the troublesome technical matters that are frequently arising, and second, because the extent of the work in a single small municipality is too limited to enable it to pay a medical health officer for devoting such time to the work as will make him conversant with all the phases of public health work, or be willing to antagonize persons whose selfish interests he may affect.

To illustrate this point, I may mention the facts again and again brought to my attention by those interested in cheese factories, viz.: that Local Health Boards or their officers have failed either to suggest or enforce measures for remedying the nuisances so dangerous to the manufactured products, caused by the disposal of the refuse from these factories. Your secretary has been appealed to to have special Provincial powers given to the inspectors of cheese factories. Similar appeals have been made to obtain Provincial powers for inspectors *re* tuberculosis in cattle. Appeals have again and again been made to have Provincial inspectors appointed by the Government, though, as we know, there are now five Provincial inspectors dealing with the inspection of factories.

Obviously then, the object of the Act in the appointment of Local Boards of Health for the ordinary small municipal areas, but especially for the development of scientific sanitation through medical health officers, has failed of its accomplishment. No physician conscientiously desirous of doing good work will, or can be expected to, place himself in a position so anomalous and undignified as the instances quoted show it to be; and hence we have now to enquire whether after 15 years, during which the science of Preventive medicine has grown so marvellously in exactness and the certainty of the methods to be adopted, there is not another means by which, with the expenditure of even less public funds, results can be obtained commensurate with the outlay and in keeping with scientific advancement in other fields of public work. Manifestly there are three conditions necessary to accomplish the desired end.

First.—Enlarge the area of the sanitary district to such an extent that it can afford to pay adequately for the services of a medical health officer, who shall devote all his time to the work.

Second.—Ensure the training of men in the various branches of applied science necessary to fit them to perform well the duties of a medical officer of health.

Third.—Permanency of tenure of office.

Dealing briefly with the first, it may be said that the electoral divisions, or the districts for which county inspectors of schools are appointed, would be amply large enough to give to a single medical health officer the very fullest occupation.

As regards the second point, men having a science degree in arts and a degree in medicine, would readily be able to fit themselves for the work, and prove their fitness by

examinations specially held on the class of work to be done. There will be no serious difficulty about getting trained men if the opportunities for permanent appointments exist.

As to the third point of permanency of tenure, it is unnecessary to do more than say that, like all scientific work, its very progress demands that medical health officers be kept apart from those questions which seem to-day to almost inevitably drag ordinary citizens within their influence. The man of science everywhere, as in our colleges, cannot afford for the sake of his work to meddle with political questions, and by the same right he may demand that he shall not be made their football, and that in the work of a health officer, where of necessity he must oppose himself at times to selfish interests, the public must insure for him that he be independent in action.

These matters, gentlemen, have seemed to me so important at the present juncture that I would in conclusion respectfully suggest that your Board will use all its influence to have the needs of its work in the matter so strongly set forth that a bill for amending the Public Health Act in this direction may be prepared for submission to the next meeting of the Legislature.

I have the honor to be,

Your obedient servant,

P. H. BRYCE,

Secretary.

The report was unanimously adopted.

Replies to Questions in circular dated February 15th, 1898, and sent to Medical Health Officers.

Question 2.—Is the appointment of Medical Health Officers and Sanitary Inspector made annually? If not state definitely on what terms the Council made the appointment.

(T.=Towns or urban; P.=Township or rural.)

County.	Annually.	Pleasure.	Permanent.	County.	Annually.	Pleasure.	Permanent.
				<i>Brought forward</i> . . .	93	13	2
Algoma T . .	1			Middlesex T . .	4	2	
Brant P . .	3			Muskoka P . .	6	1	
Bruce T . .	1	1		North'd and D. T . .	2		
Carleton P . .	2	1		Norfolk P . .	6		
Dufferin T . .	4			Ontario T . .	3	1	
Elgin P . .	5			Oxford P . .	5	1	
Essex T . .	1			Peel T . .	2	1	
Frontenac P . .	3			Peterboro' T . .	1		
Grey T . .	2	1		Perth P . .	1	1	
Haldimand P . .	4	1		Prescott and R T . .	2	1	
Hastings T . .	0		1	Prince Edward P . .	1	1	
Halton P . .	5			Renfrew T . .	4		
Huron T . .	2	1		Simcoe P . .	2		
Haliburton P . .	4			Stormont, D. and G. T . .	3		
Kent T . .	3			Victoria P . .	9		
Lambton P . .	1	1		Waterloo T . .	2		
Leeds and Grenville T . .	2	1		Wentworth P . .	4		
Lennox and Ad'ton P . .	7		1	Wellington T . .	2		1
Lincoln T . .	2	1		Welland P . .	3		1
	3			York T . .	2	1	
	3				2	2	
<i>Carried forward</i>	93	13	2	<i>Total</i>	204	28	5

67 Question 3.—Are you paid an annual salary? If so, is this supposed to cover all work which the Act requires you to do, as in an epidemic?

County.	Annual salary.	Fees or work done.	Nothing.	County.	Annual salary.	Fees or work done.	Nothing.
				<i>Brought forward....</i>	33	70	3
Algoma	T. 1			Middlesex	T. 3	3	
Brant	P. 2	2	1	.....	P. 2	5	
.....	P. 2	2		Muskoka	T. 1	2	
Bruce	P. 3	2		.....	P. 1	5	
.....	T. 3	5		North'd and D.....	T. 1	2	
Carleton.....	P. 1	1		.....	P. 1	7	
.....	T. 2	2	1	Norfolk	T. 1	2	
Dufferin.....	P. 2			.....	P. 4		1
.....	T. 2	2		Ontario	P. 2	2	
Elgin	P. 2	3		.....	T. 2	1	
.....	P. 2	3		Oxford	P. 1	4	
Essex	T. 2			Peel.....	T. 1		
.....	P. 3	2		.....	P. 1		
Frontenac	T. 1		1	Peterboro'.....	T. 1	2	
.....	P. 1	1		.....	P. 1	1	
Grey	T. 2	2		Perth	T. 1	1	
.....	P. 1			.....	P. 1	5	
Haldimand	T. 3			Prescott and R.....	T. 1	1	
.....	P. 2	3		.....	P. 1	2	
Hastings	T. 1	2		Prince Edward	T. 3	3	
.....	P. 1	4		.....	P. 1	2	
Halton	T. 3	1		Renfrew.....	T. 1	3	
.....	P. 2	2		.....	P. 3		
Huron....	T. 1	4		Simcoe	T. 3		
.....	P. 3	3		.....	P. 5	3	
Haliburton	T. 2			Stormont, D. and G.....	T. 3	3	
.....	P. 1	2		.....	P. 6		
Kent	T. 1	1		Victoria	T. 5		
.....	P. 6	1		.....	P. 2	2	
Lambton	T. 3			Waterloo	T. 1	1	
.....	P. 5			.....	P. 1	1	
Lanark	T. 3			Wentworth	T. 1	1	
.....	P. 1			.....	P. 1	3	
Leeds and Grenville.....	T. 3			Wellington	T. 3	1	
.....	P. 3			.....	P. 2		
Lennox and Ad'ton.....	T. 1			Welland	T. 2		2
.....	P. 1	2	1	.....	P. 2	2	
Lincoln	T. 4			York	T. 2	1	
.....	P. 4			.....	P. 4		
<i>Carried forward</i>	33	70	3	<i>Total</i>	82	158	6

Question 5.—What is your annual salary? What amount did you or your predecessor receive in 1897 for both regular and special work?

(Note.—The total salaries in any county are added together in the columns.)

Towns.				Townships.			
County.	Salary.	No. of towns	No salary.	County.	Salary.	No. of towns	No salary.
	\$ c.				\$ c.		
Algoma	50 00	1		Algoma	12 50	2	
Brant	450 00	2		Brant	56 65	2	
Bruce	65 00	4		Bruce	30 50	4	
Carleton	20 00	1		Carleton			0
Dufferin			0	Dufferin	27 00	2	
Elgin	425 00	4		Elgin	30 00	2	
Essex	516 00	3		Essex	40 00	4	
Frontenac	400 00	1		Frontenac			0
Grey	7 50	2		Grey	53 00	4	
Haldimand	10 00	1		Haldimand			0
Haliburton			0	Haliburton	7 00	1	
Lanark			0	Lanark	12 00	2	
Leeds and Grenville.	2 00			Leeds and Grenville.	20 75	2	
Lennox and Ad'ron.			0	Lennox and Ad'ron.			0
Hastings			0	Hastings	36 75	3	
Halton	85 00	3		Halton	20 00	1	
Huron	80 00	2		Huron	34 50	3	
Lincoln			0	Lincoln	10 00	1	
Lambton	3 50	1		Lambton	13 50	3	
Kent	2 10	2		Kent	200 00	6	
Middlesex	10 50	5		Middlesex	70 75	7	
Muskoka	25 00	1		Muskoka	30 00	2	
North'd and D.	50 00	1		North'd and D.	43 00	4	
Norfolk	25 00	1		Norfolk			0
Ontario	4 00			Ontario	72 25	3	
Oxford	55 60	2		Oxford	68 00	4	
Perth	200 00			Perth	32 00	3	
Prescott and R.			0	Prescott and R.	20 00	2	
Peterboro'	220 00	3		Peterboro'	139 50	2	
Peel	25 00	1		Peel	50 00	1	
Prince Edward			0	Prince Edward	23 00	2	
Renfrew	5 00			Renfrew	17 00	2	
Simcoe	80 00	2		Simcoe	105 50	8	
Stormont, D. and G.	25 00	1		Stormont, D. and G.	201 00	5	
Victoria			0	Victoria	135 00	5	
Waterloo	75 00	2		Waterloo	50 00	2	
Welland			0	Welland	78 75	6	
Wentworth	817 00	2		Wentworth	29 00	2	
Wellington	125 00	3		Wellington	14 40	2	
York	3,065 00	4		York	105 00	4	
Total	6,923 20	55	10	Total	1,888 40	108	5

Question 6.—Is a regular annual grant made by the Council for the work of the Local Board of Health? If so, how much?

County.	Yes.	No.	Amount.	County.	Yes.	No.	Amount.
			\$ c.				\$ c.
Algoma	T	2		Muskoka	T	3	
Brant	P	6		Northumberland	P	6	
Bruce	T	1	200 00	and Durham	T	2	200 00
Carleton	P	2		Norfolk	P	5	15 00
Dufferin	T	3	50 00	Ontario	T	4	
Elgin	P	6		Oxford	P	1	85 00
Essex	T	1		Peel	T	2	100 00
Frontenac	P	2	1,900 00	Peterboro'	P	1	50 00
Grey	T	4	25 00	Perth	T	3	100 00
Haldimand	P	1	600 00	Prescott & Russell	P	2	
Lanark	T	2		Prince Edward	T	1	
Leeds & Grenville	P	4		Renfrew	P	11	18 00
Lennox and Ad-	T	3		Simcoe	T	2	
dington	P	1	100 00	Stormont, etc.	P	4	25 00
Lincoln	T	2	10 00	Victoria	T	9	
Hastings	P	3	500 00	Waterloo	P	5	
Halton	T	2		Wentworth	T	4	
Huron	P	4	30 00	Wellington	P	2	9,500 00
Haliburton	T	2	12 00	Welland	T	3	325 00
Kent	P	4	25 00	York	P	2	50 00
Lambton	T	2	50 00		T	6	
Middlesex	P	3	200 00		P	3	35,569 00
	T	5	20 00		P	6	
	P	8	2,000 00				
Carried forward.				Total	41	222	51,934 00
16 boards from cities and towns grant							\$51,374 00
13 boards from townships grant							560 00
Total							\$51,934 00

Question 7.—Are the members of the Local Board of Health paid a per diem allowance for meetings ?

County.	T. or P.	Paid.	Not paid.	Per diem.	County.	T. or P.	Paid.	Not paid.	Per diem.
				\$ c.					\$ c.
					Brought forward..		39	74	
Algoma	T.		2	1 50	Middlesex	T.	1	4	(\$2.00, 5 meet- ing.
	P.	4	3	3 50		P.	8		
Brant	T.		2		Muskoka	T.		4	
	P.	1	1	2 00		P.	2	2	
Bruce	T.	1			Northumberland and Durham	T.		3	
	P.		10	2 00		P.	6	1	(\$3.00 and \$2.00 mileage.
Carleton	T.		1	2 00	Norfolk	T.	1	2	
	P.	1				P.			
Dufferin	T.			50	Ontario	T.		4	
	P.	2	1			P.	4		
Elgin	T.		1	(\$2.00 and 10c. mileage.	Oxford	T.		3	
	P.	4	3			P.	3	1	1 50
Essex	T.		1	2 00	Peel	T.		2	
	P.	4	1			P.	1		
Frontenac	T.		1	1 50 to 2 00	Peterboro	T.		1	
	P.		3			P.	3	1	1 00
Haldimand	T.		1		Perth	T.		2	
	P.	2	3			P.	4	1	
Lanark	T.		3	2 00	Prescott	T.			2 00 and 2 50
	P.	3	1			P.	2		
Leeds and Gren- ville	T.		3		Prince Edward	T.		1	
	P.	2	2			P.	4	4	
Lennox and Ad- dington	T.	1	1	{ Chairman, \$20. Secretary, \$25. M.H.O., none.	Simcoe	T.		4	1 50
	P.	1	1			P.	4	3	2 50
Lincoln	T.		3		Stormont, Dun- das and Glen- garry	T.		3	
	P.	1				P.	4	2	
Hastings	T.		1			P.		2	
	P.	2	4		Waterloo	T.		6	\$2.00 mileage.
Halton	T.		4	2 00		P.	6	5	
	P.	2			Wentworth	T.	{ Free 'phone }	1	
Huron	T.		4			P.		3	1
	P.	2	1	2 00	Wellington	T.		4	
Haliburton	T.		2			P.	4		2 00
	P.		4		Welland	T.		2	
Kent	T.		4			P.	3	3	
	P.	4	2		York	T.		3	
Lambton	T.		3	(\$1.50 and mile- age.		P.	4		2 00
	P.	2	1						
Carried forward.		39	74		Total		106	143	

Question 9.—How much is paid the Sanitary Inspector per annum, or if not annually, how is he paid?

County.		Annual salary, S. I. and con- stable.	Paid for work done.	Nothing.	County.		Annual salary S. I. and con- stable.	Paid for work done.	Nothing.
Algoma	T.	2	3		<i>Brought forward</i>		44	44	1
	P.				Muskoka	T.	3	4	
Brant	T.	2				P.			
	P.		1		Northumberland and				
Bruce	T.	5			Durham	T.	2		
	P.		6			P.		4	
Carleton	T.		1		Norfolk	T.	2		
	P.	1				P.			
Dufferin	T.				Ontario	T.	5		
	P.		1			P.		2	
Elgin	T.	4			Oxford	T.	3		
	P.		2			P.	1	1	
Essex	T.	3			Peel	T.	1		
	P.		1			P.	1		
Frontenac	T.	2			Peterboro'	T.	3		
	P.	2	6			P.			
Grey	T.		1		Perth	T.	2		
	P.	2	4			P.		2	
Haldimand	T.	1			Prescott	T.			
	P.		2			P.		2	
Hastings	T.	1	1		Prince Edward	T.	1		
	P.		2			P.		1	
Halton	T.	3	1		Renfrew	T.	2		
	P.		1			P.			
Huron	T.	1			Simcoe	T.	3		
	P.		1			P.	3	2	
Haliburton	T.				Stormont, Dundas				
	P.		1		and Glengarry	T.	2	1	
Kent	T.	3				P.			
	P.	1	5		Victoria	T.			
Lambton	T.	3				P.		2	
	P.					P.	3	1	
Lanark	T.	3			Waterloo	T.	3		
	P.	1	1			P.	2		
Leeds and Grenville	T.	2			Wentworth	T.	2		
	P.		1	1		P.		1	
Lennox & Addington	T.	2			Wellington	T.	4		
	P.		1			P.	1	2	
Lincoln	T.	2	1		Welland	T.	2		
	P.					P.	4		
Middlesex	T.	5	1		York	T.	4		
	P.	3	3			P.		2	
<i>Carried forward</i>					Total		65	33	

REPORT ON OUTBREAK OF TYPHOID FEVER IN RAT PORTAGE.

*August 2nd, 1898.**Report of the Secretary, on Contagious Diseases during the quarter.**Mr. Chairman and Members of the Provincial Board of Health :*

GENTLEMEN,—By reference to the published reports which are distributed monthly to every secretary of a Local Board of Health and to every newspaper in the Province, you will notice the absolute deaths returned for each of the notifiable diseases.

The returns for July have not yet been tabulated, the law requiring that they be in by the fifth of each month.

The returns made from day to day to August indicate however a continued low mortality, there being but two notable outbreaks of disease; one of these at Rat Portage, the subject of special report, and the other in Ottawa.

By comparison with the figures for 1897 representing a smaller population it will be seen that the mortality from scarlatina and diphtheria in 1898 is still lower than the low rate for 1897. Measles has shown a mortality though small in the total, yet rather greater than in 1897. It is notable, however, that the deaths in the city of Ottawa from this disease should in July have risen to nine, or more than for the whole Province in June.

It is quite evident that the measures for suppression exercised are wholly inadequate, and it again brings the question before this Board and the public, How are measles to be controlled?

From information obtained from various sources, your secretary became aware that typhoid fever had again appeared in Rat Portage. In the thirty days preceding July 20th five deaths had occurred, although not returned by the monthly report to the Registrar-General.

Your secretary, with the approval of the Minister of the Department, visited the district and has endeavored to obtain the facts regarding the outbreak.

From the report made to this Board of the outbreak in 1897, it became apparent that there were two principal sources of the disease.

1st. The polluted bay water along the docks which was used by private parties, by employees on steamboats, and pumped to several hotels and other buildings.

2nd. To the use of water from wells so situated as to be almost certain of contamination.

It will be remembered that the Board has approved of a public water supply, which is being put in at much expense, and will in a few months be available for general use, should the town Council and Local Board deal strongly with the question of closing all wells in any way liable to pollution.

The following facts were developed by the investigation :

1st. That five cases occurred in employees on steamboats.

2nd. That five cases (and probably five more) occurred in C.P.R., employees who used tank water supplied from the polluted bay by a steam pump. The second five cases occurred in employees who may have used polluted water at points along the railroad where they worked.

3rd. At least four cases occurred in a large hotel, which pumped bay water by a steam pump.

4th. The balance of cases, some 15, seemed associated with the use of well-water, but from no particular well.

5th. That at least one physician stated that he had attended some 30 or 40 cases of what he called "malaria."

It was most gratifying to have found that no case was associated with the use of Lake of the Woods water as supplied by licensed water-men from above the town.

It was thus apparent that the prohibition of water from every other source seemed desirable, and will be possible when the water works have been completed. In the meantime, a careful personal investigation by your secretary was made of the different sections of the town, and some 40 water samples taken from wells for examination.

Such investigation, showed a town which has developed remarkably under notable physical difficulties, owing to its hilly and rocky character.

Many streets of well-built houses with new ones springing up on every hand are seen, and while there was room for the extensive operation of the new scavenger by-law to go into operation in September, yet Rat Portage, with a public water works and a sewerage system, with the dry earth-closet by-law enforced, bids fair to become, with its splendid Lake of the Woods, one of the most progressive and healthiest towns in the Province. Your secretary in view of the unsuccessful attempt of the Local Board to deal with a recalcitrant owner of a large hotel, felt it his duty to instruct the County Crown Attorney to prosecute under section 29 of the Public Health Act.

The regrettable fact is again made apparent by the returns, that tuberculosis still claims the majority of victims from contagious disease, and shows for June, a mortality equivalent to that of 1897, although the decrease in some centres, has been so repeated for several months as to be notable.

The Province has been free from smallpox, during the quarter, but the unfortunate condition of the Halifax quarantine management, by which smallpox has gone past in two ship-loads of German immigrants, resulting in detention camps for 1,200 persons in Manitoba for the last two months, indicates with the presence of 15 cases at one point in Ohio, that the disease is not dead, but only awaiting an opportunity for spreading again.

It is appropriate that school authorities should take advantage of the season to require certificates of vaccination from all school children returning to the schools in September.

All of which is respectfully submitted,

(Signed) P. H. BRYCE.

REPORT ON SANATORIA FOR TUBERCULOSIS.

November 30th, 1898.

Quarterly Report of Secretary.

Mr. Chairman and Members of the Provincial Board of Health :

GENTLEMEN,—With regard to the Province of Ontario, it may very well be said that during the past quarter no sanitary subject has loomed up more largely in the public interest than the problem of the prevention of tuberculosis.

1. Thus we have had the monthly Statistical Report, which has given regularly the total number of deaths which the disease has exacted from our people.

2. The subject received special prominence in the discussion both at the meeting of the Executive Health Officers' meeting, and that of the American Public Health Association in Ottawa.

3. We have had reports of the special steps which are being taken for the establishment of the Citizen's Sanatorium and Hospital for Consumptives in Toronto.

4. The published first annual report of the institution of the National Sanatorium Company at Gravenhurst.

5. Communications from the medical officer of Niagara Falls of the general application of the tuberculin test in the county of Lincoln, to cattle.

6. The reports in the newspapers of the proposal for Homes for Consumptives for Ottawa and Chatham.

The newspapers have had published papers, and extended editorials dealing with different phases of these subjects, and your Board has distributed a large number of copies of your Secretary's paper, "On the duties of the Public in dealing with Tuberculosis."

This activity in so many directions indicates most surely, how thoroughly aroused both the professional and general public have become in this problem of problems, which is receiving as great or greater prominence both in Great Britain, on the Continent and in the United States.

This Board may feel that the educational work which it has done, as illustrated by the series of letters, reports and papers published during the last 16 years, has not only spread useful truths amongst the general public, but also, that the organized public health machinery of the county, state and municipal authorities in Ontario is now beginning to give practical effect to what their people are demanding.

To again present in a condensed manner what are the needs of persons in those occupations, which cannot be said to enable families to maintain for any length of time, their sick without great sacrifice, the following table of occupations has been prepared, which indicates exactly, the degree to which different classes fall victims to this disease in Toronto.

Laborers	147	14 per cent. of all Occupations.
Artizans	288	28 " "
Business men (inc. clerks and travellers).....	124	12 " "
Farmers	29	2 " "
Students (18) School children.....	27	.. " "
Professional men (inc. 9 male teachers).....	26	2 " "
Gentlemen	14	1.4 " "
stenographers, Telegraph and Telephone	15	1.4 " "
Public Officials.....	8	0.8 " "
Sailors.....	6	0.6 " "
Soldiers.....	3	0.3 " "
Convicts	2	0.2 " "
Pedlars	1	0.1 " "
		690

Females (only).

Housewives	221	22 per cent. of all Occupations.
Servants	36	3.6 " "
Widows	28	2.8 " "
Milliners and Laundresses	21	2.1 " "
Female Teachers	14	1.4 " "
Nuns.....	14	1.4 " "
Farmer's wives.....	3	0.3 " "
		337

Both sexes (under 15 years	737
No occupation given (Female)	395
No occupation (Male).....	105
	1,237
	2,264

Exclude the following classes of Business men, Professional men, Gentlemen and officials, these being

Business men, which includes 80 book-keepers, salesmen and clerks.....	124
Professional men	26
Gentlemen	14
Public officials	8

172

and the balance (excepting an uncertain number from housewives) or 83 per cent. of the occupations given, belong to those earning a daily wage, and it will appear, how large a proportion of the 2,290 who died within 5 years, an average of 458 annually, are unable to adequately maintain a long financial fight against disease.

How many motherless children are left behind, is seen in the fact of "Housewives" standing prominent as first in the list; and how "Sisters of Mercy" fall victims to this disease in their lives of self-sacrifice, is too truly indicated by the tell-tale records. How many are found from each of the several artisan classes, need not be specially singled out; but what is plain, is that very few indeed in the list are in a position to take advantage of what Dr. Sir William Broadbent, once again points out—"fresh air and fresh air." He has repeated one might say word for word, what we have been teaching for years, and gives illustrations of how such is the only successful method for dealing with tuberculosis.

How far the Government may be prepared to go in aiding such "Homes for Consumptives," need not here be discussed, but it is plain that the disease comes so specially under the list of contagious diseases to be dealt with under the Public Health Act, that local health authorities must of necessity be those who have to take up the practical work in this matter as naturally, and along lines as similar as those dealing with other communicable diseases. When that ponderous body, the London, England, County Council has begun to move positively along the lines of the Royal Commissioners' Report on "Tuberculosis," then may we in Canada with our simpler problems, unhesitatingly deal with and solve them as we have so many other health questions.

So firmly convinced is your committee, that the time has come for an active propaganda for the establishment of County Homes for Consumptives, that it would urge that the Board discuss the plan for arranging for meetings during the coming winter in our principal centres for organizing local committees to act in conjunction with the local health authorities for erecting County Homes in favorable localities.

Regarding the further problem of local cattle inspection and factory inspection, we may expect work in this direction to go hand in hand with that of taking care of those already tuberculized.

With regard to the work of establishing sanatoria elsewhere, we find Chicago has just opened one with a capacity of 350 beds, especially for the consumptive poor; another has been established by the "Sisters of Mercy" in New York State; New York City has a place for its tuberculous poor, at a cost of \$60,000, and Massachusetts has opened one near Boston.

Turning to England, the number of addresses and editorials in the medical journals of the last two months, dealing with this very subject, is most remarkable. That most remarkable is by Sir William Broadbent, M.D., of St. Mary's Hospital, London, at the opening of the Technical College, Huddersfield. After stating that the total deaths in Huddersfield in 1897, from tuberculosis, was one in every 7.5 deaths, he says:—

"It is often the most gifted, the most useful, the most diligent, the most amiable who are carried off in this way." Is this not so? And then it is so tedious and trying and often so painful and distressing a way of leaving the world; and so expensive too, frequently exhausting the entire resources of a family. "Consumption is one of the products of men's ignorance and carelessness."

"The room or rooms in which a consumptive patient has lived and died, ought immediately to be disinfected under the supervision of the medical officer of health."

To prevent the disease in those with inherited susceptibility, he says:—"The most effectual of these is to live as far as possible in fresh air day and night, summer and winter.

Ventilation is of vital importance, "But it is necessary by night as well as day. "I believe that if we all slept with open windows the mortality from consumption would be reduced by one-half from this alone."

"Nothing can be more efficacious in preventing the spread of consumption, than to cure those already affected by it, unless indeed you kill them off out of the way. Now a great deal more can be done to arrest and cure phthisis, than was formerly supposed possible by means of what is called, and what is in truth the open air treatment." We have become alive to the fact that the curative agent is not any particular air, but simply air. Thus the remedy for consumption lies ready to our hands, and instead of being obtainable by only the favored few, is available for all."

Dr. Broadbent referred to a pamphlet by Dr. Philip of Edinburgh, entitled, "On the universal applicability of the Open-air Treatment of Pulmonary Tuberculosis." Dr. Philip at Edinburgh, Dr. Bredon, living on the Norfolk Coast, Dr. Gibson in Ireland, have showed consumption can be cured in practically all parts of our Islands. "If consumption is preventable, it ought to be prevented—if it is curable it ought to be cured. What is needed for this end is, the erection of suitable sanatoria, and these ought to be provided within easy reach of every large town."

"The construction of these sanatoria will be simple. The one thing about them will be that it shall be impossible to close the windows of any room in them day or night. They need be little more than sleeping sheds; but of course they would be made as cheerful and bright as possible. Patients will spend the entire day in the open air, wet or dry, warm or cold.

"Movable shelters will be provided to shield them from cold winds, and to protect them from the rain.

"On no pretext will he sit indoors. The amount and kind of exercise he may take will be determined by his temperature and strength, and his life will be regulated in every respect."

"No great barrack building will be required. A sanatorium will usually consist of a number of small separate pavilions, which will be erected one after the other." Again he says:—

"The Association which I have the honor to represent as chairman of the organizing committee, has for one of its objects, the promotion of the erection of sanatoria in all parts of the country. It is to be hoped, and indeed confidently expected, that local branches will be formed for the purpose of ministering to local needs. Such branches will collect and expend their own funds, and will erect sanatoria at any suitable spot in the neighborhood so that patients will not have far to go away from home. The special function of the National Association, will be to co-ordinate the work of different branches, to stimulate public interest in the prevention of consumption, and to co-operate with all the agencies which have for their object the promotion of public "health."

"Clergymen and ministers of religion, who see in the way of duty so much of the suffering and distress occasioned by consumption will, we think, eagerly grasp the opportunity of informing themselves how the disease may be combatted and prevented, and of disseminating the information among families, reinforcing the efforts of the medical men. School masters and mistresses again can do much to teach the children the lessons of health and self-preservation."

In the *Lancet's* editorial October 29th on Sir William Broadbent's address, it refers to Lord Vernon's efforts to reform public milk supplies, and to the efforts of the Liverpool, Manchester and London Councils, in dealing with the inspection of meat and milk supplies.

The *Lancet* has further an editorial on "Open air treatment of Tuberculosis for Infirmary Patients," by Dr. N. Raw, Medical Superintendent of Mill Road Infirmary,

Liverpool. He has reported "On the need of the establishment of Sanatoria for the treatment of Tuberculosis. After pointing out how the disease is lessened by sanatoria, Dr. Raw gives figures of the records of the Infirmary." He says for whereas in 1893 of the total number of consumptive patients admitted, numbering 349—there were 121 died, while in 1897-98 there were but 195 admissions, and 88 deaths. Dr. Raw explains the principle of the open-air treatment which he says, "can be carried out in this country, thus obviating the necessity of sending tuberculous patients to seek sunshine and air in foreign lands."

He says:—

1. The building should be well arranged with a southern aspect.
2. A dry, pure, well-drained subsoil.
3. Pure atmosphere and abundant sunshine.
4. A large garden or grounds well protected from wind.
5. Sheltered verandahs facing the sun.
6. Proper supervision.

How this idea of small sanatoria of simplest characters has spread, we see in Dr. LeGendrie of Paris, pleading for a number of small sanatoria, in order to obtain the best results.

Reverting to the problem of what must be dealt with in the class of institutions we have been referring to, the test of occupations given already, and the percentage of those of the working classes, sufficiently answer the problem.

As Dr. Knopf of New York, in a late paper on the "State and Municipal care of Consumptives, says in answer to this question, any government (State or Municipal must, if it is earnest in its endeavors to control tuberculosis effectually, take upon itself the care and treatment of all curable and incurable cases of tuberculous patients, among the poor and those of limited means. I mean here by limited means, a practical condition which does not permit a tuberculous patient to enter a private sanatorium or to have at home such medical hygiene and dietetic care as will assure him the best possible claim for recovery."

To determine who such are, there should, Mr. Knopf says, be special official medical enquiries to determine—

1. By medical examination, the condition of patients.
2. To institute hygienic measures in his home.
3. To examine other members of the family for initial tuberculosis.
4. To report condition of dwelling to sanitary authorities.
5. To determine the financial state of patient and his family.
6. That where necessary the state may care for patient.

Smallpox.—The past quarter has, as previous ones during the year, been marked by a low mortality from the several contagious diseases. It has, however, been marked by the appearance of smallpox in three municipalities; a convalescent case having escaped from Detroit to Chatham, another person resident in Camden Township (Kent Co.) having brought the disease from Detroit, while a third case came to Cobourg from Rochester. Owing, however, to the measures taken by the local authorities, supplemented by the action of your secretary, there was no extension from the first houses infected in any case. The cases have been:

Chatham	1
Camden	4
Cobourg	1

With the disease present, however, in a number of municipalities in New York State many cases in Ohio, and cases occurring at times in Michigan, it will be seen that we are likely to have occasional cases introduced into the Province during the winter, and local authorities are advised of the danger from the general neglect to vaccinate school children. With the preparation of glycerinated vaccine now becoming so general, and the use of antiseptic methods in its preparation, there ought to be no hesitation in having this certain preventative against smallpox generally carried out.

The monthly deaths from diseases reported by all Division Registrars show very consisely the actual condition of the public health as regards contagious disease. Your secretary is especially gratified, as Deputy Registrar General, in being able to report that these reports were received from 707 out of 750 municipalities for October, being a report on 97 per cent. of the total population of the Province. This work has steadily gone on, and if the work of the Local Boards were on a par with the assiduity of their secretaries, the present rate of deaths would be still further reduced.

Scarlatina has notably increased in prevalence, the chief centre being, as last year, Toronto. Until actual medical supervision, as is provided in New York, Boston and other places, made by morning visits of medical men to the schools,—and thereafter carefully following up to their homes absentees, and those who may have been exposed in a room where scarlatina, diphtheria, or measles may have been,—it does not seem that any other means will serve to deal effectively with these diseases. To illustrate this point we need only take the results of a year's medical inspection of the schools in Boston, Mass.

	Total Deaths.		
	1894.	1895.	1896.
Diphtheria	817	588	516
Scarlatina	192	114	121

Scarlatina being often mild, no physician is called on, often for fear on the part of the parents that their other children will be isolated and the house placarded. Learning from the schools of absentees would enable the health authorities to ferret out such cases and have them isolated.

Typhoid fever has been more prevalent, as usual, during the past quarter than during any previous quarter of the year. How your Board is going to deal with this prevalence, which is almost wholly in rural districts and villages, where well water is wholly used, is a problem demanding solution. Wells tell still the old story; and the remarkable fact exists, as will be shown in a supplementary report by the bacteriologist of the Board, on an outbreak in one of the oldest and wealthiest townships, that the farm wells of to-day seem to be located with as little regard to health as fifteen years ago, and are subject to pollution in the same way. There seems no present solution, except the radical one of a County Health Officer with plenary powers to institute systematic investigations, and have new wells constructed and located away from the local sources of pollution.

The local nuisance problem in the rural districts and smaller towns equally demands urgent consideration. Such a condition as that illustrated by the report forwarded to this Board by the Department of Agriculture at Ottawa regarding the condition of large piggeries near Ottawa, where the city offal is fed, reveals a state of affairs which your Secretary has again and again vainly attempted to have dealt with by the Local Board of Health. Conditions but little better exist in the neighborhood of all our larger centres, and in spite of the fullest powers to deal with such under the Act, the rural boards have proved utterly useless for the purpose. Raw, putrid offal is systematically fed, although the animals are liable to seizure and a heavy fine for the offence can be levied. Again the county officer with full powers to inspect, suggest remedies, and prosecute for non-compliance is so far as I know the only remedy.

Complaints having been made of the pollution of the Welland Canal waters, which flow from Lake Erie, by the drainage from large swamps in Humberstone and Wainfleet Townships, your secretary visited the district. Welland, Merriton, and St. Catharines all use the canal water as a public supply, and it is essential that such be maintained pure. A full report on the effect of the several pollutions will be made when the investigations are completed.

Several outbreaks of diphtheria have occurred in the back settlements and unorganized districts of Frontenac, Hastings, Muskoka and Parry Sound, which will be found referred to in the correspondence.

REPORT ON TUBERCULOSIS IN ITS RELATION TO MILK PRODUCTS AND ON INSURANCE SOCIETIES AND CONSUMPTIVE SANATORIA.

Quarterly Report of the Committee on Epidemics.

TORONTO, 31st January, 1899.

Mr. Chairman and Members of the Provincial Board of Health :—

GENTLEMEN.—The past quarter has not been marked by any special prevalence of contagious diseases in the Province, dealt with under Public Health Act, although the remarkable climatic changes of the past month, have been productive of an abnormal prevalence of diseases of the respiratory tract, and notably of Influenza, showing in many instances a markedly infectious character.

Such influences have similarly tended to an increase in diphtheria, of which the monthly reports show 51 deaths or a rate above the average for the year.

Typhoid fever has shown a notable decrease in deaths, there having been in December, only 21 deaths. Reports from Kaladar Township have come to hand, telling of a notable prevalence of the disease for several months past, in the rural district amongst poor settlers, and points to the obvious need of some means of systematic investigation and control superior to that possible in a township with a population of 360 ratepayers, and an assessment of \$73,000 with a tax of 19 mills. Such outbreaks illustrate the absolute necessity for a trained County officer, who could devote the necessary time to the control of such an outbreak.

Scarlatina shows a low incidence during the quarter.

Smallpox is however again present in the Province, while its prevalence in surrounding States, with its appearance in immigrants from a European port, and its presence in Quebec, Manitoba, and British Columbia, all call for the prompt action of the Local Boards of the Province in preparing for its approach by at once taking steps for a general vaccination of our people, who have greatly neglected this precaution since the great Montreal epidemic in 1885.

The statement as seen in the table submitted shows the actual status of the disease in all neighboring states and in the Province.

The scientific progress in the last few years in the preparation of aseptic glycerinated calf-vaccine lymph has made great strides. The Local Government Board of England, has instructed public vaccinators to use glycerinated calf lymph in preference to humanized lymph.

Health authorities of New York, Chicago, and other places, are preparing and using it; large private firms have it on the market, and your Committee would advise that the proprietor of the Ontario Vaccine Farm, be notified to arrange for the preparation of lymph in a similar manner.

The splendid results of such glycerinated preparations, in successful vaccinations and the absence of suppuration, when the operation is carefully performed, encourage the hope that any apprehension on the part of any person as to the results of vaccination, may be wholly removed. What the unvaccinated are exposed to, is seen in the unfortunate case of the young man in Walford Township, who died on Saturday last. The medical health officer reports the receipt by deceased of a letter from a brother in British Columbia, and written apparently from a house, wherein, as the letter states, "his employer had just died of smallpox." No other sort of contagion seems possible, so far as reports go. Owing to the delay of six days before the nature of the disease was discovered, others of the family are likely to take the disease; neighbors exposed, and there is almost a certainty of a number of more cases occurring. With prompt action by the

local authorities, there is reason to hope that the outbreak will be limited. There will, however, be a serious expense to the municipality involved; yet if municipal authorities and private persons continue to neglect vaccination, such expense may be expected.

Owing to cases reported in Hawkesbury East Tp., Prescott Co., contiguous to the Quebec County of Soulanges, where several cases exist, a Medical Inspector of your Board has been dispatched, to visit the districts where cases are reported, and to take steps to have the local authorities active in the suppression of the outbreak. What further steps may be deemed necessary to be taken in view of the present situation, will be for your Board to determine.

Tuberculosis.—The past year has been marked by remarkable activity in different countries as well as in the Province, in the progress of the movement for suppressing the prevalence of tuberculosis.

This has taken two directions, the one, the establishment of Sanatoria, for treatment and of notification of cases; and the second has been the renewal of the crusade against milk and its products, which may carry the germs of tuberculosis.

English public opinion so conservative, so slow to be aroused to action, yet so characteristically practical when aroused, has, during the past year, years after France, Germany and Denmark have instituted practical measures for dealing with the disease, developed an activity positively surprising. By far the most advanced in its systematic municipal sanitation, which in England has in 30 years caused the mortality from consumption to be reduced 50 %, and has resulted in a death rate in that densely populated country of but 1.3 in the 1,000 or lower in 1896, than Ontario in 1897, the English people, led by His Royal Highness, have declared that tuberculosis is a disease which can be prevented, and therefore must be, and a National Association with him at its head, has been formed to aid municipal establishment of local sanatoria for its treatment. But more than this, they have by a Royal Commission based on experimental evidence, declared that the dairy is a fruitful source of this disease; and experimenters are there daily accumulating further evidence of its truth.

The most recent of such results are those published in the *Lancet* of January 14th, 1899, giving the experiments instituted by Prof. H. H. Kanthack, Professor of Pathology, Cambridge University, and who has died almost on the completion of the work.

The investigation was begun in April, 1898, as to the effects of the milk supply sent daily to the different colleges of that city. Daily samples were taken direct from the milk cans of vendors, and from a half to a drachm of the creamy portion, and of the sediment were injected into the groin of guinea-pigs, each into a separate animal. Microscopic examinations were also made of each sample.

Summed up, the following results were obtained: Of the ninety guinea-pigs inoculated, twenty-three died, or 25.05 per cent. Of these, thirteen were from the creamy layer, and ten from the sediment.

Of the sixteen dairies examined, all supplying mixed milk, nine supplied milk which caused tuberculosis. The report states: "It is therefore not unreasonable to regard these dairies as a grave source of danger."

The same number of the *Lancet*, in its Berlin correspondence, gives the latest results of experiments at the Imperial Hygienic Institute, on tubercle bacilli in butter. Dr. Obermuller found bacilli in each of fourteen samples supplied by the same tradesman. Dr. Hermann found it in fifty per cent. of ten samples from three shops. Dr. Petre, of the Imperial Health Office, found them in 32.3 per cent of ten samples from different shops.

Dr. Lydia Rabinowitch found in one set of samples seventy per cent., and in another set from the same shop one hundred per cent. containing bacilli. All the animals inoculated with this butter produced typical symptoms of tuberculosis.

It was remarked that the most numerous and virulent samples were from the principal shops in Berlin.

Remembering the long repeated and strenuous endeavors of this Board to point out to the public, and to local health authorities, the danger from infected milk products, remembering that the actual deaths in Ontario from diseases returned as tuberculosis have reached in 1897 for the first time 3,000, or 3,154 exactly; remembering that in the class returned as infantile debility, atrophy and premature births of children under one year, many, and probably most of which were tubercular, there were 2,279 deaths, 1,709 congenital debility, 574 other diseases of infancy; remembering that this class of diseases in England has not decreased notably, while consumption proper is lower than in Ontario; it seems regrettable in the extreme, that after all efforts put forth, but two, or at the most three, of our 747 municipalities have attempted to deal with the question of milk from tuberculized cows. And is it to be wondered at, when we see one of the leading dailies, which wields so potent an influence upon public opinion, publishing twice within the past few months, articles on the "Tuberculosis Scare," making statements showing apparently a marvellous ignorance of facts, which have been abundantly illustrated in a hundred laboratories, and by the tell-tale statistics of the registration returns of every country and large city in the world?

We have seen years of neglect of cattle inspection result in the embargo being placed on Canadian cattle in England; we have seen, to remedy the exclusion of American bacon from Germany, an elaborate Governmental system of inspection in the United States of hogs for export, and now we see added to this a close inspection of all dead meat for export from that country, establishing for them a reputation Canada will not readily establish, if she does not follow with similar work.

Now, we hold largely the cheese market of Britain, and hope to gain the butter market. But if we are to maintain our present position, if we are to gain what we are longing to obtain, surely those who are seemingly prepared to close their eyes to what affects the lives of our own people, will begin to see that the interests of true commercial enterprise demand that we send commercial products to foreign countries with such an assured wholesomeness that there will be no danger of our losing what it has taken such great pains to obtain.

In the report of Dr. McEachren published in August, 1898, by authority of the Minister of Agriculture, Ottawa, the magnificent commercial results of the scientific production of milk in Berlin, and of the Milk Supply Company of Copenhagen, are illustrated, and if it were necessary the results of similar methods in use on this continent could be quoted to amply indicate that any attempt at reactionary methods, whether private, municipal or governmental in this work, based upon science, must to-day end disastrously and in commercial loss.

That these views will be borne out in practice may indeed be further argued from what has appeared in the to-day's telegraphic despatches from Britain in which the committee of the British Medical Association appointed to consider the tuberculosis question is reported as stating that municipal authority should be exercised, 1st to prevent any house from being built unless it be on a dry site and foundation, with sufficient space to admit free sunlight and air; 2nd that such authorities should be empowered and required to construct municipal abattoirs and that killing of meat be prevented elsewhere; and 3rd that inspection of cowsheds and cows should be regularly carried out and that all milk for public use should be prohibited, where the tuberculin test had not been applied.

Sanatoria for Consumptives.—The agitation for the erection of sanatoria has developed with amazing rapidity. Although such have existed for years it is but very recently that their development has become systematized. As in so many other scientific phases of Medicine, Germany has led the van in this work, and it has been curiously illustrative of the intimate relationship which the financial aspect has with sanitary development.

As early as 1867, Dr. Schæffle began the agitation there through his writings for compulsory workmen's insurance. The Hon. Joseph Chamberlain in England has agitated for it, and claims that though such insurance be socialistic, it is less harmful as Schæffle asserts, than are existing forms of charity.

When the bill re compulsory workingmen's insurance was being debated in Germany in 1881, Bismarck said, "Call it socialism or whatever you like, it is the same to me." Up to this time, great development of insurance through friendly societies had taken place, but in 1883, compulsory insurance for sickness and accidents became a part of Imperial Legislation. The bill was intended to apply as early as practicable to 12,000,000 people. Under the bill all laborers, artisans, post and telegraph operators, soldiers and sailors and others whose daily wage does not exceed $6\frac{3}{4}$ marks (or \$1.59) were included. There are commercial, local and state insurance organizations, as well as those of different classes of artisan or guild and free associations or friendly societies. The largest are the commercial, probably over 40 per cent. belong to these.

Every man obliged to insure belongs to that local factory, guild, or other association which exists where he works.

The contributions are based upon the rate of wages, it may be up to 2 per cent. of their wages. The expenses of any association must in no instance be more than $4\frac{1}{2}$ per cent. of the wages.

The aid given varies in different associations to different classes of persons.

The minimum sick pay is 50 per cent. of the average wage, and the limit of its payment is usually up to thirteen weeks, but may continue for a year. Instead of medical attendance and sick pay, free treatment in an hospital may be given. In the case of death twenty times the amount of wages of common laborers is given, and in no case more than forty times the amount of this sum.

In 1891 the cost of sickness in the different associations amounted to..

\$21,312,610 00 = 90.61 per cent.

Cost of administration..... 1,175,968 00 = 6.02 "

Expense for number insured in 1891 3.58 "

Total associations in 1891 21,498.

Cost of medical attendance and medicine, 1891.....\$7,399,125.

These figures have been given in semi-detail in order that the scope of these associations may be understood and that their relation to the growth of the sanatoria for Consumptives may be seen.

Since the institution at Gorborsdorf, in 1862, of Brehmer's Sanatorium, and of Detweiler's at Falkenstein a few years later, it has gradually come to be understood that consumption dealt with promptly and intelligently is in large measure a curable disease. In one report which has come to hand of the operations of Dr. Weicker's Sanatorium at Gorborsdorf, for 1897, where there are now several of these institutions, it appears that 547 were treated in 1896 of whom 62 only were supplied wholly by the insurance companies. Of the other 485 cases the daily cost was 3.96 marks, of which 121 m. was private funds and the balance 2.75 m. supplied by the insurance companies were sent there by some of these insurance societies. The term there for which they received the sick benefits was 13 weeks. At 50 per cent. of the wage \$1.59, they would be paid \$5.60 a week, so that it will be seen that an ample amount was paid, if it all went to the sanatorium for their care. The remarkable fact is stated in the report that of the workmen thus sent away, 80 per cent. were reported so cured in 13 weeks treatment as to resume work, the workpeople doing better than the others comparatively. One reason being given, viz, that they were sent early. Many interesting details might be given from this report but the chief one is that of the fresh-air treatment and strict sanitary regimen, with easy tasks interspersed with recreation.

To what an extent these sanatoria are being utilized by the insurance societies in Germany, from the purely commercial standpoint, that of saving money in death claims, may be gathered from the fact that in 1898, they have paid between three and four million marks for the maintenance and erection of such sanatoria for the people or nearly a million dollars. As stated in a recent number of the *Lancet*, elaborate statistics are given by one institution of 1,541 phthisical patients, showing that general improvement has taken place in 85.5 per cent., local improvement in 61.1 per cent., complete restora-

tion of working capacity in 71.8 per cent. In 15.5 local signs, slight on admission disappeared, 15.4 local signs remained unchanged, and in only 6.6 per cent. did local signs increase. It is also shown that a large proportion of those treated in former years remained well. These statistics are given of sanatoria, not in mountain regions only but in the best selected sites in various localities.

We are thus brought again to the subject of dealing with such in our own Province. In the five years' statistics of deaths in Toronto, ending 1898, it was shown that some 80 per cent. belonged to the artisan classes most of whom are in positions comparable to those treated in Germany, and whose deaths leave so many families dependent on charity. How shall the matter best be taken up in our Province? At present we have no compulsory insurance law, but we have hundreds of friendly societies. Surely the local health authorities may be expected to aid in the establishment of institutions, where these societies may be expected from the purely financial standpoint, apart from that of brotherhood, to supply the funds for the care of their sick, while others would be similarly maintained by friends and the church organizations to which they belong.

QUARTERLY LABORATORY REPORT.

By J. J. Mackenzie, B.A.

{Toronto, May 19th, 1898.

The Chairman and Members of the Provincial Board of Health :

GENTLEMEN,—In connection with the work in the laboratory of the Board, I beg to present a report of the work done in the five months ending April 15th. I select that period, as it includes the winter months, and will show the extent to which the work has increased.

In presenting this report, I wish to especially call attention to the necessity of the Board taking some steps to either lessen the amount of routine work, or to provide means to overtake it, as matters have now reached such a point that I find myself unable to overtake all that is sent in, and I cannot find time for the more important scientific investigations which are continually presenting themselves, and which would be of special interest to the Board, if carried out in its laboratory.

I have endeavored, also, as showing the methods pursued elsewhere, to collect data as to the laboratory work done by other Provincial and State Boards of Health.

During the past five months, there have been examined in the laboratory, 581 samples of suspected diphtheria ; 58 samples of suspected tuberculous sputum ; 31 samples of suspected typhoid blood ; 74 samples of water, and 44 miscellaneous examinations. This is an average per month of—

Diphtheria swabs	116
Water samples	15
Sputum	10
Typhoid	6
Miscellaneous	8
Total	155

In addition to this, I have (excepting the serum for the diphtheria examinations) to make up all my own media and prepare all the other material used in the laboratory, and also carry on the clerical work of reporting results. That the work will continue to increase is to be expected, and this increase will become more rapid as the districts availing themselves of the laboratory, become more numerous. The effect of this press of work has been that reports are delayed ; that sufficient time cannot be given to the work, and that special investigations are absolutely stopped.

I began over a year ago an investigation upon rabies, which I have been compelled reluctantly to give up in spite of the fact that I have succeeded in accumulating a lot of valuable material, if only time could be obtained to work at it.

The question of antitoxin tests is of pressing importance, but so far only one sample has been tested, a report of which was presented at the last meeting of the Board.

The question of formaldehyde disinfection, and the most practical methods to be used under the conditions obtainable in Ontario, is another subject which should have been taken up before this.

In the matter of bacteriological water analysis, I feel particularly the need of time. Every sample of water requires to be studied specially from a bacteriological standpoint, and may be considered in each case the subject of a special investigation, but at present we must content ourselves with a quantitative examination, and a very cursory qualitative examination, with the result that it is difficult sometimes to give a safe opinion upon the water. A point of more than ordinary interest, is the bacteriology of our northern Ontario brown waters, and the behaviour of pathogenic bacteria in them, and until the question is thoroughly studied, we may say we have a quantity of unknown conditions present of a hygienic character, which render difficult the questions of pollution and potability of these waters.

There are two possible solutions in this question, one is to put a certain restraint on the work by charging a small fee which would be applied to meeting the expense of the laboratory ; the other is by giving the assistance necessary to carry on the work.

The first method is the one pursued in a good many States, but it would be difficult to retire from the position which we have taken, of doing the work gratis.

The second method must be resorted to sooner or later, even if fees are charged.

I have prepared a short statement of the methods pursued elsewhere, which is as follows :

In Quebec there is a chemist and bacteriologist employed by the Board, who are paid a retaining fee, and receive the fees for the work done. They each depend for assistance chiefly upon that which they receive from their University or hospital positions.

Fees charged are as follows :—

Water—Chemical	\$15 00
“ Biological	15 00
“ Combined	25 00
Milk—Chemical	5 00
Sputum	5 00
Meat	5 00
Special	\$10 00 to 20 00

In Michigan the large staff of the State University is used, and fees are charged for the work done.

In Pennsylvania there are two chemists and two bacteriologists, besides assistants. These officials hold other positions, but devote a certain time to State work. The State charges fees as follows for each sample of water, chemical or bacteriological, \$7.50.

For private diphtheria examinations, \$1.50. Every municipality can, however arrange for diphtheria examinations by paying according to population, as follows :

5,000	\$ 15 00	per annum.
10,000	25 00	“
15,000	30 00	“
20,000	35 00	“
25,000	40 00	“
30,000	45 00	“
50,000	50 00	“
Over 50,000	100 00	“

In Massachusetts no fee is charged, and the state maintains a staff of sixteen to do chemical and bacteriological work, with the result that the Massachusetts State Board of Health are everywhere considered the most valuable sanitary publications in the world.

In New Jersey there is no chemical work done by the board, the bacteriological work is done free of charge by a chief bacteriologist and assistants.

In New York chemical analyses of water are done by the board. The bacteriological work of the board is done outside and fees are paid.

In Wisconsin a State chemist with assistants does the chemical work. There is a consulting bacteriologist paid by and the secretary of the board does diphtheria and sputum free of charge.

In Indiana the work is done free of charge to municipalities, but is paid for by the State, the State board reserving the right to refuse to do work if appropriation is expended.

In Ohio the State chemist does the analytical work free of charge, and they are now endeavoring to obtain the appointment of a bacteriologist.

In Minnesota the work is done free of charge; there is a State bacteriologist who does no chemical work and who has three assistants.

It will be seen from this brief synopsis that in some States fees are charged, in others none; but in all cases it will be noted that a much larger staff is required to do the work in practically every instance where the chemical work is separated from the bacteriological.

What is required here is that the chemical work should be separated. Not only does it break into the ordinary bacteriological work, but also no chemical analysis to be accurate should be made in a bacteriological laboratory. There is required also an assistant, who would be able to do a certain amount of the routine work of making media, making diphtheria and sputum preparation for examination (under control of course), and reporting of results.

If this were done, the value of the laboratory to the Board would be enormously increased, and work could be carried out of much more lasting benefit to sanitary science than the mere routine examination of swabs and sputum.

OUTBREAK OF TYPHOID FEVER IN HAMILTON TOWNSHIP, DURHAM COUNTY.

By J. J. Mackenzie, B.A.

Toronto, Nov. 29th, 1898.

To the Secretary, Provincial Board of Health:

DEAR SIR,—I beg to submit a preliminary report upon an outbreak of typhoid in the Townships of Hamilton and Hope which I have been investigating.

The outbreak has been chiefly in the Township of Hamilton and is confined to nine houses within a comparatively limited area set forth in diagram; in all there were twenty-one cases with one death.

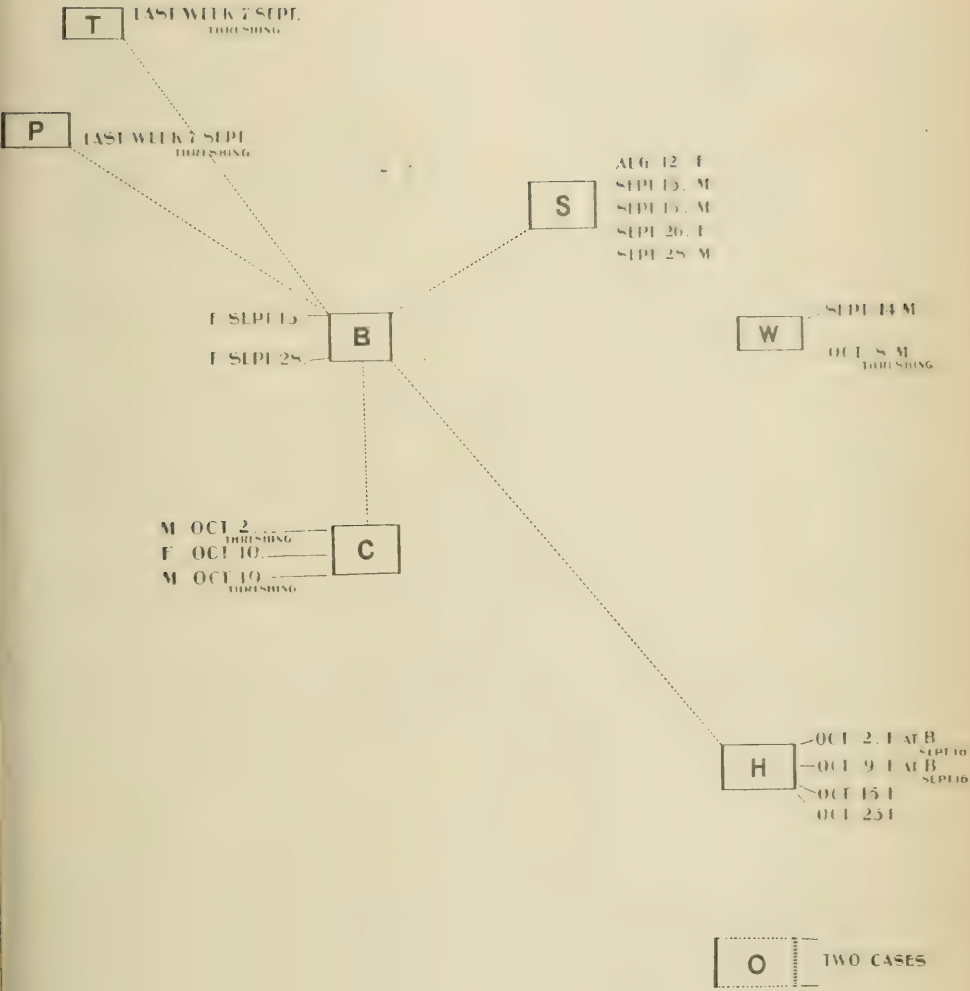
The outbreak began with a case in the S—— household on Aug. 12. In regard to this first case, I could not find any history of exposure to infection. The patient had been in Port Hope for a few hours on one or two occasions but had been chiefly at home.

The next case developed in the same household on Sept. 13, a third on Sept. 15 and two more before the end of the month.

On Sept. 15 a case developed in the B—— house, situated a few hundred yards from the first house and in a family using water from the S—— well.

On Sept. 12th there was a threshing bee at the B—— house and the water used came from the S—— well, and of twelve who were present six took typhoid. It would look as if this threshing were the opportunity for infection and the cause of infection the water of the S—— well which was used by the threshers. Unfortunately for this

DIAGRAM SHOWING POSITION OF HOUSES WHEREIN OCCURRED CASES OF TYPHOID FEVER IN HAMILTON TOWNSHIP.



theory, however, the cases developed somewhat late. Taking all the 21 cases by weeks the incidence was as follows :

Week ending Aug. 13.....	1 case.	(S—.)
“ Aug. 20.....	None.	
“ Aug. 27.....	None.	
“ Sept. 3.....	None.	
“ Sept. 10.....	None.	
“ Sept. 17.....	4 cases.	{ S— 2. W— 1. B— 1. T— 1. P— 1.
“ Sept. 24.....	2 cases.	{ S— 3. B— 1. C— 1. H— 1.
“ Oct. 1.....	3 cases.	{ W— 1. H— 1. H— 2. C— 1.
“ Oct. 8.....	4 cases.	{ C— 1. H— 1.
“ Oct. 15.....	3 cases.	
“ Oct. 22.....	1 case.	
“ Oct. 29.....	1 case.	

Finally two cases which I have no date for as yet.

Of the cases which might be traced to drinking water at the threshing two developed within two weeks, one three weeks, one three weeks and six days and one five weeks and three days.

There were four cases in the H— household, all females. The first two had been at the B— house about Sept. 16th, and probably drank the water there ; they developed typhoid two weeks and three weeks later. Two others developed in the same household, one Oct. 13th and the other Oct. 23rd.

There is finally a case, W who developed the disease on Sept. 14th and who was not at the threshing. This case was a boy and the father was at the threshing and developed but not for three weeks and six days after.

It was difficult to obtain exact facts as to the extent to which these cases visited either of the infected houses, but I think it is probable that there was more exposure than is indicated.

In regard to the general features of the outbreak it is to be noted that the first case preceded the others by over a month. It also preceded the other cases in the same household by the same period, and beginning with Sept. 12th and taking the period until Sept 30th, of nine cases which developed, six are known to have used the S well constantly, whilst two used at the threshing. One only remains in doubt as to the infection.

It seems probable, therefore, that the water of the S well became infected between Aug. 12th and Sept. 12th, and that a fair proportion of the cases were due to the use of this infected water.

The well is situated in the yard near the kitchen, it is about 30 feet deep through clay and has a good supply. Is not known to go dry. Fifty-seven feet away is the privy box, a dry earth affair, which is however only cleaned spring and fall. About the same distance is the stable and ground around the well is in a very filthy condition.

An analysis has not yet been made of the water, but I have no doubt it will turn out to be bad.

The meteorological conditions do not seem to throw much light on the cause of the outbreak except that the weather was exceptionally hot during the first four days of September and there was rain at Port Hope on the 4th, 5th and 6th.

It is probable that a certain number of cases which occurred after Oct. 9th was due to direct infection from previous cases in the same household, as in all cases there were cases already in these houses.

The cases according to families were as follows :

S— family..... 5	H— family..... 4	T— family..... 1
B— “ 2	W— “ 2	P— “ 1
C— “ 3	A— “ 1	O— “ 2

THE DISINFECTION OF THE DOMICILES OF TUBERCULAR PATIENTS.

November 30th, 1898.

*By J. J. Cassidy, M.D.**To the Chairman and Members of the Provincial Board of Health :*

GENTLEMEN,—The necessity of disinfecting the domiciles of persons who die of tuberculosis, or even rooms in houses which have been temporarily occupied by tubercular patients seems obvious enough to sanitary authorities. And the reason for that is simply because we believe that tuberculosis is a disease which may be transmitted from one person to another. Remove the cause and the effect disappears. In fact, one of the postulates of sanitary science in reference to the prevention of tuberculosis is : Remove the bacilli tuberculosis from inhabited places, prevent the deposition of fresh bacilli therein and a vast diminution in cases of tuberculosis will soon be apparent. This doctrine has not yet received the adhesion of all physicians, some of whom are incredulous of the transmission theory and believe that tuberculosis is caused by a degeneration of the organism resulting from hereditary weakness, overwork or excesses, together with insufficient or improper nourishment. Needless to say, a layman who derives his views and the etiology of the disease in question from such a professional source will not notify the municipal health department that a tubercular son or daughter has occupied a room or rooms in his house. Neither will a hotel-keeper inform the health department that a tubercular guest, who has gone south for the winter or become an inmate of a sanatorium in Ontario, occupied a room in his house for several months. To overcome this obstacle I would recommend that tuberculosis be made a notifiable disease, the subsequent management of any given case to be conducted so as to obtain the best result whether in a domicile or at a sanatorium. Owing to the wide prevalence of tuberculosis in Ontario, there being an annual mortality from that disease of 2,757 in 1896, it is most important that notification should be given to the civic health authorities, because no matter what the termination the case might be, the disinfectors could take suitable means in the infected locality to destroy the bacilli which are the active agents in propagating the disease.

In order to ascertain the practice among Ontario health officers in this matter a circular letter, asking if disinfection of the domiciles of tubercular cases is done by the civic health department and in what manner, was sent by me to the medical health officers of Toronto, Hamilton, London and Kingston. The following replies have been received :—

TORONTO, November 25th, 1898.

DR. CASSIDY,
69 Bloor St., East, City.

DEAR DOCTOR CASSIDY—In reply to your communication of November 23rd, I desire to state that in a number of cases disinfection of the domicile after tuberculosis patients have died or vacated the premises is asked for and done by the department, in which cases the rooms are disinfected with 1 to 1000 of bichloride, and the bedding, etc., by steam sterilizer.

Faithfully yours,

CHARLES SHEARD, M.D.,

Medical Health Officer.

HAMILTON, ONT., November 28th, 1898.

DEAR DR.—No disinfection has been applied for after the death or removal of a tubercular patient in this city.

Yours respectfully,

L. RYALL,
Medical Health Officer.

J. J. CASSIDY, Esq., M.D.,
Member Provincial Board of Health,
Toronto.

LONDON, ONT., November 29th, 1898.

MY DEAR DOCTOR—Concerning tuberculosis. Disinfection after death from tuberculosis or removal of patient of house, dwelling or home has been asked for only three times during the year in this city. Formaldehyde was the agent used. I am doing my utmost to educate the people up to the necessity of disinfecting, isolating and in every way circumscribing the direful ravages of this disease.

Yours very truly,

T. G. HUTCHINSON,
Medical Health Officer.

J. J. CASSIDY, Esq., M.D.

KINGSTON, ONT., November 28th, 1898.

DEAR DOCTOR—In reply to your enquiry. My answer is, no.

Your obedient servant,

SAMUEL H. FEE,
Medical Health Officer.

BROCKVILLE, ONT.

Dr. Vaux had one case in which application for disinfection was asked for after death of a patient.

It is quite evident from these replies, that this most important feature in the prevention of tuberculosis is neglected in Ontario. As illustrative of what might be done to decrease the prevalence of tuberculosis in this country, I shall read you an abstract which I have made of the Parisian method of disinfecting the domiciles of the tubercular poor. At the congress of tuberculosis, held at Paris, last July, Dr. J. A. J. Martin, Inspector General of the health department of that city, read a paper, descriptive of the efforts made to restrict human tuberculosis by procuring the disinfection of the lodgings, occupied by tubercular patients. He endorsed the recommendation of the French Academy of Medicine, which favoured (1) the use of spittoons for the pocket or the apartment; (2) the disuse of sweeping and the use of a damp mop for cleansing floors; (3) disinfection of the domicile after a patient's death, or even after a short occupation of the premises by a tubercular patient, and also disinfection of the body linen, bed linen, etc. After describing the present status of gaseous disinfection by sulphur or formaldehyde, Dr. Martin gives the preference to the washing or spraying of surfaces with antiseptic liquids. Washing or spraying, the latter especially, if done in a careful manner by practised hands, possess the double advantage of securing the cleanliness of

the place to be disinfected, and rendering it habitable in a relatively short period. The necessary displacement of the furniture, also brings into notice portions of the room, which, too frequently remain in a flagrant condition of filth. Floors are scrubbed or mopped. Whitewashed walls and ceilings are retouched. Where the walls are papered, antiseptic sprays of mercuric chloride and chloride of sodium are used, and a sterilizing of tubercular dust has been thus obtained, equal to what has resulted from a lengthy contact of the surfaces of a room with an antiseptic gas. The principal antiseptics used are :—Fresh milk of lime ; solution of chloride of lime ; (100 grains of commercial chloride of lime to 1,200 grains of water, then, after filtration, dilute to a strength of 1 in 10 ; solution of commercial formol, 5 grains to the liter of water ; solution of carbolic acid, 5 per cent. ; solution of cresyl, 5 per cent. ; wood vinegar ; solutions of soap, and especially the solution of mercuric chloride mixed with chloride of sodium, which, as Miquel has recently shown procures the definite and immediate sterilizing of tubercular sputa, owing to the property possessed by the chloride of sodium of dissolving the insoluble albuminate of mercury.

The disinfection of domiciles for tuberculosis has now been in operation in Paris for six years. The number of disinfectants asked for or accepted, was 4,541 in 1892 ; 8,128 in 1893 ; 7,514 in 1894 ; 9,225 in 1895 ; 9,330 in 1896 ; 10,194 in 1897 and 6,979 in the first half of 1898. These figures will be increased during the second half of the present year, because the sanitary authorities of Paris intend to extend, experimentally, to an entire arrondissement of the city the preventive measures, which have been applied systematically to the tubercular poor, who have been cared for in their own homes. Over two years ago the French Commission on tuberculosis had recommended a certain number of preventive measures to be put in force in the case of poor people treated in their own homes. Closely adhering to the instructions of the commission the following plan of action was adopted: (1) Two spittoons were placed in the domicile of each patient. After different trials, the department decided in favor of a colored glass article, flat-bottomed and formed of two opposite cones, it is made so that, the fingers are protected against soiling by the expectoration, which drops easily into the contained liquid and it is steady enough to be placed near the patient, who, in many cases, is often left alone in his room. It seems to answer better than the heavier articles, formerly in use, for which the patients substituted a wash-basin or enamelled spittoons. (2) A certain amount of liquid should be left in the spittoon. This regulation has been generally observed, but, in a good many cases, the patients have objected to carbolic acid on account of its disagreeable odour increasing their cough. Then water is therefore used instead. (3) The spittoon should be cleaned every day, by putting it into cold water, which is subsequently raised to the boiling point. The physicians, however, unanimously recommend, that the spittoons should be emptied into the water closets and then rinsed out. The department agree to this innovation, being convinced that in the houses of the poor, it is often impossible to obtain the cleansing of a spittoon with boiling water, as frequently the necessary kitchen utensils are lacking and for the greater part of the year a fire is not available. (4) Soiled linen ought to be steeped in boiling water for five minutes. For reasons similar to those last given, in nine-tenths of the cases, this precaution could not be observed. Where conveniences were wanting, the department recommend that the soiled articles be put aside, so that they could be disinfected by the municipal sanitary service. This was done and without much trouble, save in one of the quarters of Paris, where the tubercular poor had no linen to wash. The public assistance will assuredly interfere to provide for such a lack of clothing. (5) After death, cure or departure, the disinfecting service perform the usual offices without much difficulty. The disinfectors go at least once a week to the domicile of each patient. They exchange disinfected linen for the soiled linen, which they carry off to the disinfecting machine ; the water closets and utensils, used by the patients, are cleansed with antiseptic fluids.

The greatest obstacle to practical disinfection has been the notification of the patient's disease to the authorities. Soon after notification the patient was considered, as if he were a leper and, in some instances, was expelled from his lodgings. Thus the disinfecting operations were not regularly and completely carried out, except in a little over 50 per cent. of the cases. It was the same after a death. These difficulties, however, were

noticed only in some places. The spittoons and disinfection were accepted and even asked for in three arrondissements, in two other arrondissements, however, some ignorant or evil-minded neighbors caused the failure of the municipal preventive measures. "The spittoon is a great success, says one of the physicians, who have taken most interest in introducing it, because it collects all the contagious droppings, which, formerly, were discharged at the caprice of the patients, and most frequently on the floor of his room. Our tubercular cases accept freely the spittoons and the weekly cleansing of the water-closets. The sanitary service does the work with regularity."

The regular disinfection of consulting rooms, houses of refuge, civic offices or places frequented by the tubercular poor is done without difficulty. Whenever a tubercular patient is admitted into a hospital, notification by telephone is sent to the civic health authorities, who immediately despatch the disinfectors to do the necessary work at his vacated domicile. These officials are not in all cases permitted to do this office, for the simple reason, that the transmission of tuberculosis from one person to another is still very far from being believed in by the Parisian people.

Such are the measures which will be systematically applied, as fully as possible, in one of the arrondissements of Paris, and, doubtless, later on in others. Joined to disinfection directly asked for or accepted after a death has occurred or during the course of a patient's illness, as well as disinfection of lodging, after location and before inhabitation, which is asked for more and more every day, the sanitary resources of the French capital against tuberculosis will be very much strengthened and improved. As Dr. Martin says, the principal obstacle to practical disinfection in Paris, has been the notification of the patient's disease to the health authorities. This arose from the unreasoning terror of some persons when confronted with the dread word "contagion." The only remedy for ignorance is instruction, and when people in Ontario learn how the contagion of tuberculosis is acquired they will not object to the systematic removal of the sources of that contagion. Physicians should frankly say that tuberculosis is contagious, but they should explain how, when and why contagion takes place. Information should be given the public about phthisis just in the same way as about scarlatina, typhoid fever or diphtheria. That this has been done of late is quite true. The medical press has teemed with articles on the prophylaxis of tuberculosis, and, as you are aware, important papers have been read on this subject by members of this Board. The ready response made in Toronto to a call for the establishment of a home for consumptives shows that the public taste has been influenced by the medical opinion. The Sanatorium for the consumptive has come to stay. Patients sent to Sanatoriums must, however, be those who are in the first or second stage of phthisis. Advanced cases would not be benefited by Sanatorium treatment and would probably increase the labours of the attendants, with a corresponding increase in the mortality statistics of these institutions. Such advanced cases will therefore be treated in their own domiciles or in an hospital. In the former case the civic health department should be notified by the attending physician, or in case no physician is called, by the householder, so that when the rooms are vacated the disinfectors may take possession and do the necessary work. In case the patient goes to an hospital or sanitarium, notice should be sent from the institution selected to the civic health department of the municipality to which the patient belongs, so that similar precautions may be taken. It is not possible to struggle successfully with an enemy like tuberculosis if the field of battle is enveloped in darkness. If hygiene is to do satisfactory work in reducing the mortality from tuberculosis the leading feature of the campaign must be prevention and the first and most important step in that direction is to apply the search-light of notification, after which disinfection logically follows.

Vide sections 81, 82, 83, Ont. P. H. A.

Vide section 13, Rule 3, Ont. P. H. A.

THE PLACE OF SOCIETY IN DEALING WITH CONSUMPTION.*

By P. H. Bryce, M.A., M.D.

Your Excellencies, President and Ladies of the National Council of Women :

LADIES AND GENTLEMEN,—Some months ago, in Philadelphia, I presented a paper before the International American Public Health Association, whose annual meeting, I am pleased to know, is to meet in Ottawa in September next, on "The Place of the State in dealing with Tuberculosis," in which I endeavored to indicate by illustrations from methods actually existing in Ontario during the last twenty-five years, dealing with the insane, the feeble-minded, the aged and the sick poor, what I conceived to be the relations of state and municipal authorities to a disease which causes in Ontario annually some twelve per cent. of all the deaths, more than twice as many as all the deaths from the several other contagious diseases reported monthly; slays annually a total equal to three fifths of the total inmates of the seven Provincial institutions for the insane, whose exclusive demand for their yearly maintenance is \$595,843.13.

This disease of consumption has at the present moment, at a moderate estimate, 6,000 persons, adolescents and adults, within its grasp in the Province of Ontario, and will within the year have seen some 3,000 of them "Cross the bar," while under present conditions at least 3,000 more of their comrades will have silently stepped forward to fill up the gaps, which this most fatal of weapons forged has made in the ranks, notably of those at an age capable of bearing arms. To-night, speaking as I do to an audience assembled under the auspices of an Association, the moral sense of the women,—indeed I might say the people of Canada, I shall endeavor to set forth the place which society itself, which elects and instructs her representatives, whether state or municipal, finally in all matters occupies in relation to this disease, which bears so heavily upon it, whether as an aggregation or as individuals.

In a very remarkable work entitled, "The Ascent of Man," by Henry Drummond, D.D., lately deceased, he has drawn a very neat and important distinction in relation to that problem of problems, the evolution of the world, of its inhabitants—indeed of society. Ever since Darwin's "Descent of Man," published in 1862, we have had set before us as the one "thing of life" and the condition of progress, viz.: the "Struggle for existence," and introduced into what we call Sociology it is the basis of the argument for the "Competitive system" which we are asked to recognize as the principle underlying all modern progress, and to excuse every form of individual or collective slavery, which grosser selfishness may cause to grow therefrom. Another law inevitably and unalterably associated with this which Drummond calls "The Struggle for the Life of Others"—the theory of "Altruism"—arises out of the fundamental functions of living organisms upon which existence depends. The two seen together appear in their simplest forms, viz., in the mother as nutrition, or the struggle for her own existence, and, if life or the race is to continue, equally the struggle by her to nourish and maintain life in her offspring. Hence "altruism," the very theory expressed in the words of the Divine Master, which have been adopted as the motto of the National Council of Women, "Do unto others as ye would that others do unto you," is being realized as having as scientific a basis as that other primal law, the struggle for life, both of which are indissolubly bound up in every complete scientific scheme by which society does not only exist, but struggles to evolve a higher life, a nobler ideal, a greater progress, whether viewed from the physical, material and commercial, or social and moral standpoint.

Without attempting to elaborate what I know this audience will agree with me in believing as axiomatic truths, it will, however, be of interest to us to apply these principles to the subjects under discussion to-night.

If we investigate the causation of disease we very soon discover that they have their natural history, just as do plants and animals, as have the rise and fall of inland streams, as indeed the flow and ebb of the tides. Cholera, yellow fever and malaria exist in countries where they may be said to be indigenous by virtue of the conditions of soil pollu-

* An Address before the National Council of Women at Ottawa, May 17th, 1898.

tion and organic decay in tropical climates; scurvy finds its victims within the sub-arctics where men are deprived of vegetable foods, and tuberculosis especially prevails in temperate climates, and in populous centres where imperfect nutrition and mal-nutrition are too often associated with the fierce competition, not for subsistence so much even as for wealth. Yet as plants and animals of one climate may be acclimatized in another, or may become extinct in their native habitat by the persistent pursuit of enemies, or by removal to another and unfavorable environment, so we find that cholera has again and again burst forth as an epidemic even in temperate climates, scurvy has appeared in tropical prisons, and consumption has become domiciled in the cottage of the settler planted on the illimitable prairie. In all life, therefore, whether of the disease germ or of man, we have the normal individual, the individual as affected by heredity, and the individual as influenced by his environment.

Keeping these seeming common-places before us, I think we shall be able to clearly comprehend why it is that the haunts of nature, as yet untouched, inviolate and free from the presence of the habitations of men, should be the sanctuary of health. Imagine the stream, the water-falls, the lake expansions of any one of the hundred tributaries flowing into your noble Ottawa, where through the long winter months snows of virginal purity have fallen to yield in the spring their crystal streams to the ever-green forests, over which the winds have blown for hundreds of miles, untrodden, save by the passing huntsman or lumberman, and we instinctively know that there no disease has yet been introduced, that there no infections are harboured, and there nature gives of her best and purest and without stint. All of us know this, for who amongst us has not spent at least some part of a summer holiday in these unbounded health resorts? All know the conditions, the converse of this!

Often has the picture of Prof. Teufelsdröckh, looking down from his attic at midnight over his city of Weissnichtwas as described by Carlyle, seemed to me the most dramatic and realistic picture of what he calls the phantasmagoria of human life. Says Teufelsdröckh: "It is a true sublimity to dwell here." These fringes of lamp-light struggling up through smoke and thousand-fold exhalations some fathoms into the ancient reign of night; what thinks Bootes of them as he leads his hunting dogs over the zenith, in their leash of sidereal fire? That stifled hum of midnight, when Traffic has laid down to rest; and the chariot-wheels of vanity, still rolling here and there through distant streets, are bearing her to halls roofed in, and lighted to the due pitch for her, and only vice and misery, to prowl or to moan like night-birds, are abroad; that hum, I say, like the stertorous unquiet slumber of sick Life is heard in heaven. Oh, under that hideous coverlet of vapours and putrefactions, and unimaginable gases, what a fermenting lies simmering and hid? The joyful and the sorrowful are there; men are dying there, men are born there, men are praying. On the other side of a brick partition men are cursing; and around them all is the vast wide night! The proud Grandee still lingers in his perfumed saloon, or reposes within damask curtains; wretchedness comes into trundle beds or shivers hunger-stricken into its lair of straw; in obscure cellars, Rouge-et-noir languidly emits its voice-of-destiny to haggard hungry villains; while Councillors of State sit plotting, and playing their high chess-game whereof the pawns are men! Gay mansions with supper-rooms and dancing rooms are full of light and music, and high-swelling hearts; anon, "Riot cries aloud and staggers and swaggers in his rank deed of shame; and the mother, with streaming hair, kneels over her pallid dying infant, whose cracked lips only her tears now moisten. "But I, mein Werther, sit above it all; I am alone with the stars." Perhaps! perhaps, ladies and gentlemen, it was for Teufelsdröckh, perhaps it may be for us, a true sublimity to dwell with him, sitting there above it all, alone with the stars, a correct enough attitude for a philosopher, but not, I trust you will agree with me, for men! The Divine Master looked down upon the Holy City to weep over it; thereupon he went down to the multitude and healed their sick.

Ladies and gentlemen, I have indicated as briefly as possible the several elements entering into the problem before us to-night. These are:

- 1st. A disease, the perennial scourge of the people.
- 2nd. The two laws which enter into all life, (a) The struggle for our own existence,
- (b) The struggle for the existence of others.

3rd. The dependence of specific forms of disease, such as tuberculosis, which are but minute forms of life, parasitic on high beings, upon conditions of environment favorable or unfavorable for their development.

4th. The existence in the haunts of nature of an environment inimical to the spread of such a disease as tuberculosis.

5th. The presence down among men, as Teufelsdröck looked upon them, of conditions favorable to the laws of growth and development of this scourge of our cities.

So important to the state, to the philosophy of life, to the science of biology, to the wholesomeness of nature uncontaminated, to the difficulties which beset man in his progress upwards to a higher and more complex social existence is each of these several elements in the problem that each might profitably occupy the whole time at our disposal in its discussion; but I trust enough has been indicated to make plain to us that society, as it has evolved, as scientists tell us, from *homo alalus*—the savage with a language only of gestures and wild sounds, the denizen of caves, and perchance arboreal in his habits—to the Bedawin nomad, the shepherd with flocks and herds, thence to the man who cultivated the primal Eden, and there built the mighty cities, of that Mesopotamian land with their storied ruins, teaching us to-day of their greatness, and which the people of the continents have during the past half-century been unearthing,—has only been striving to attain to that high ideal of material progress and moral elevation, which is being foreshadowed in that Altruism, which, personified in its Divine founder, 1900 years ago, and emerging now and again in these centuries from the deep, like coral islands raised by their myriad minute builders, and like them only to be submerged again by some seismic disturbance of the social fabric, seems now to be gradually moulding society, after some regular and permanent form. We are discovering that true science is but a general term expressive of material progress, not alone of the individual, but of the nation and also of social happiness and moral and spiritual elevation.

"For we know that through the ages an unceasing purpose runs,
And the thoughts of men are widened with the process of the suns."

Let us examine for a brief moment what social progress means in this country, or indeed in any country! Man with us has got beyond the stone age, though yet we have remnants of it in some of our native races. The settler goes forth, and in this new age, fells the trees and erects the rude log cabin. At a distance from him soon comes his neighbor. The local store springs up, and near it the mill, on some convenient stream. Hence a village with its smaller lots, its aggregate of individuals. The cabin large enough for two soon has its half-dozen inmates. Soil-pollution gradually increases about the dwelling, the springs become polluted by animals and men. What to the nomad was impossible, now prevails, viz., the danger of permanent settlement. The village grows into the town. Better houses, some attempts at outward adornment, street building and walks follow. Here and there the spring or well is cared for; health is retained. But soon the diseases of aggregation, as typhoid fever, appear indoors the crowding means polluted air, aerial infection from some imported cause of disease, as diphtheria, or perchance consumption, is inevitable, and the family, indeed the very house, becomes a source of public danger. Probably the most notable fact in the development of such settlement, where the schools and churches early appear, is the relative absence of the social idea of co-operation in the matters of health, or indeed in any true sense of the word of the possibility of such. For years it has been my fortune to visit settlements in every part of the Province, and constantly have I found, that while they may be informed and instructed in all the details of some political convulsion, though they may argue with all the virulence of an *odium theologicum*,

"Of forms of faith let priests and bigots fight,"

yet I have known no longer than last year, a rapidly progressing town of 4,000 with miles of fresh water lake laving the very shores of the town site, continuing to contentedly bail water into barrels from the polluted bay, receiving the filth of the town even; although some fifty cases of typhoid had appeared in the town within a previous two months.

Churches, schools and opera house, even an hospital to receive their typhoid patients, and a splendid Queen's jubilee celebration, and yet such polluted water was given to their own people and to the travelling public, waterworks being only talked of.

Or I might take an example of one of the oldest, busiest, and wealthiest manufacturing towns of western Canada, where thousands of dollars were being spent on granolithic sidewalks, which had limestone rock near the surface, and the water from a stagnant mill-pond on the high ground soaked into the cellars of the main street, so that even in August barrels continued to float in them.

Or to take one of the larger and more rapidly growing cities in the eastern portion of the Province, with wealth, educational and religious institutions, and social brilliancy at their highest, a city which within the past five years has added more than 100 acres to her area, and yet which has again and again refused to vote public funds for a sewerage system, which alone will enable hundreds of houses over this area to have one of the primary requisites to good health, a dry cellar. Last year this city spent very largely on her charities, has at least half a dozen hospitals, has sweetness and light and legislation, yet spent but a few hundreds on public sanitation. In the words of the apostle, "Brethren, these things ought not so to be!" Perhaps it will be impressed upon some of the members of the National Council here to-night that there is here a field for a women's sanitary protective association.

There is, however, another most interesting and important phase of this modern social evolution. I have pointed out that a dry cellar and well-drained house are the simplest elements entering into the healthfulness of a dwelling. They prevent dampness and decay with their associated dangerous emanations. But while in many houses the superstructures are well built and productive of health, we have in our schools and workshops conditions demanding constant and systematic supervision. We in Ontario have much to be proud of in our school system, and indeed of our school buildings. But when we realize that in the city of Ottawa the yearly natural increase of births over deaths, allowing nothing for immigrants, means the need for the erection annually of a new school building for some 300 scholars and seven additional teachers, it will be understood that a broad and intelligent policy is demanded if we are to at all adequately meet the requirements.

Not excepting the home, where the child's first years are spent, we have in the school, where six hours a day are spent, one of the most potent influences for good or evil present in our social life. Rapidly as we are overcoming these difficulties, it is nevertheless true that some 75 per cent. of all contagious diseases are contracted through the medium of schools, while the directly malign influences of the foul air, due to overcrowding, can be seen by the most unobservant who will follow the health of his child during a school term. Parenthetically it may be remarked that female school teachers of the London (England) board schools have shown a higher mortality than almost any other class between the ages of 20 and 39.

Of this class of evil is the over-crowding of workrooms and factories. Municipally, as yet, we have done almost nothing to regulate this class of evil. Here, however, competition enters in and we are told that if the employer and the employed are agreed nothing more is to be said.

In this connection we have that other question to which we have only begun to give attention, viz., the systematic inspection of our food supplies. Is anyone seeing that the milk and meat in our markets are from healthy animals? Manifestly such supplies demand careful and constant supervision.

But I do not need to push further illustrations of the complex factors which enter into the social life of man, advanced as he has from the stage of a nomad for whom nature was the sanitarian. It is very plain that with social elevation develops the necessity for and *pari passu* with it mutual co-operation. First the co-operation is within the family, then between neighbors, next it is the community, then the town, the city, the province, the nation! And now during the balance of time at our disposal I purpose to show where this essential feature touches our lives.

In this brief tracing of society from its simpler to its more complex forms, we have been able to recognize very clearly that the very process tends to produce conditions and an environment which vary in character or degree from those normal conditions in which man, as do plants and animals, resists best the forces inimical to his healthful growth and development. Gradually acclimatization goes on, but through infinite pain. Tennyson's words are most true :

"So careful of the type she seems,
So careless of the single life!"

We have something of the change of physical environment from country to city. Teufelsdröckh has pointed out how social and moral environment are equally potent in their effects. Without, however, dwelling on those influences which have caused within recent years a new word, "Neurasthenia" to be coined, we find them expressed perfectly in a condition which every person present must recognize as that of innutrition, or otherwise malnutrition. The hurried breakfast of the working girl—often, alas, after a night of insufficient sleep, for she too must have her social pleasures,—the cold lunch at dinner hour, associated with the air impurities of work-room, or in other cases of school and home, all tend inevitably to produce, with over-study in some cases, and social dissipation in many more, the one dominating condition, that of anaemia, which, indeed, in many instances in the healthy and superadded to hereditary weakness in others, makes thousands annually amongst what Professor Verneuil characterizes *les candidats de la tuberculose*. At the risk of seeming to deal with matters too technical for a popular audience, I shall attempt to make this physiological point plain, owing to its importance in dealing with the practical phase of the problem before us, by an illustration taken from the experimental method of him, the immortal Pasteur, whom his fellow-workers and all his disciples reverently call *Le Grand Maître* of biological science.

Some of my audience will know that practically the first disease shown to be due to a microbe was anthrax, a disease which annually caused many thousands of deaths in cattle and sheep in France, but which, since Pasteur discovered its vaccine, has notably decreased, with a saving to the state of 7,000,000 francs. Now, in studying this disease, Pasteur found that he was easily able by injecting a few drops of a solution in which he had grown the anthrax germ to rapidly produce fatal disease in oxen, sheep, rabbits, and guinea pigs, but that he could never produce fatal results in fowls. Greatly puzzled, he studied the germ still further, and found it was sensitive to an increased temperature, and would not grow in the blood of fowls several degrees higher than of these other animals. Now mark the beauty of the inductive method! He immediately thought, "If I reduce the temperature of the fowl it ought to grow," and he caused a fowl inoculated with the germs of anthrax to stand in cold water so that its temperature was reduced from 42°C. to 38°C. At the end of forty-eight hours the bird was dead and its blood was found to be teeming with the microbes of anthrax. Other fowls after inoculation and similar chilling he wrapped in cotton wool and flannel where they gradually regained their normal temperature and recovered and no microbe could be found in their blood.

I trust the inference is evident. The so-called candidates for consumption, like the fowls, once perhaps normally resistant to disease, lose this in the degree that their vital powers, their richness of blood, their ability to obtain, digest, and assimilate food are reduced and lessened; and while, should the microbe of tuberculosis not be present in their respiratory passages or stomach, they will not take consumption any more than the fowl without inoculation would not take anthrax, yet it is evident that malnutrition, temporary exhaustion, a severe chilling, or a severe sickness, as typhoid fever, all create conditions most favorable for the attack of a disease whose germs are so generally disseminated in the habitations of populous centres. To use the accurate expression of Verneuil, "The changes of environment exercise a notable influence on the development, the march, and the termination of tuberculosis. These changes operate in two ways, from the city to the country (emigration *urbi rural*); from the country to the city (emigration *ruri urban*). The first renders great service to the tubercularized, the second favors on the contrary the appearance or progress of tuberculosis."

Surely, ladies and gentlemen, very manifest facts are before us ! We have a disease shown to be by far the most fatal to our people ; to be a disease due to a specific germ or microbe ; to be essentially dependent for its development upon mal-nutrition, whether hereditary or acquired ; to be dependent for its development upon an environment, essentially caused by density of population, whether localized in a single house or in many houses as in a city ; and by such other conditions as by affecting nutrition and nerve force, lessen the vital resistance of the tissues to the growth and development of the disease.

I may ask, adopting a phrase from, I believe, a certain political vocabulary, "What are we going to do about it ?" Is it hopeless to attempt the solution of the problem ? Some may be inclined to say "It is the will of Allah," but the science of to-day looks upon no problem of nature as insoluble.

Fifteen years ago, Ontario had but twelve public systems of water supply and over 3,000 deaths from typhoid fever in five years ; in 1897 she had ninety systems of public water supply in her cities and towns, and but 1,600 deaths from typhoid in five years then ending. Even with the still high mortality Glasgow has seen a falling of the deaths from consumption between 1860 and 1894 of forty-four per cent, due to improved sanitation. With such facts regarding the disease in Glasgow, and still more remembering what has been done regarding typhoid in Ontario in fifteen years, I am prepared to say that given the full knowledge of the cause and conditions of the development of tuberculosis, and fifteen years will see the death rate from this disease in Ontario reduced as much as typhoid during the past fifteen. And why dare I say this ? Primarily because science has solved the problems of the cause and prevention of the disease, and secondly because society, the State, and greatest of all the National Council of women who represent the moral and intellectual will of the people of Canada, realize to-night that there is a practical means whereby early and effective aid to recovery can be brought to the many in our communities, who hitherto have been looked upon as condemned to certain death ; and at the same time such may be saved the sad consciousness that in going down to death they are likely to drag other dear ones with them. Elsewhere I have quoted statistics taken from mortality returns in England, and such as those from the New York Health Department which state that in a single crowded ward in that city in 1896, thirty-seven per cent. of the total 663 houses were infected with one or more cases of consumption, or there were .81 per cent. of cases for every house in the ward. But it comes nearer home when I state that during ten years, of the total deaths in a single old-settled county of Ontario, thirty-seven per cent. of all persons dying of consumption were names which recurred on an average two and one-half times, and the same family name in the highest instance occurred seven times in ten years.

Let these facts both of the danger and the possibility of remedy in this disease be once fully realized by our people, as they have for years understood the dangers of spreading small pox, and to-day of diphtheria, and, in spite of the chronic course of this disease and its relatively less contagiousness, can any one doubt that in the degree which the individual, the family, the municipality, and the state appreciate the preciousness and economic value of a life or the lives of its citizens, each will put forth in its place energies adequate to meet the needs of the case. If it be asked upon what is such reasoning based, I say simply from analogy based upon facts already within our knowledge.

Sixteen years ago there were no laws in Ontario for systematically dealing with contagious disease, or the control of public water supplies. To-day in the 747 municipalities there are 5,000 men appointed by law, who, nominally at any rate, and in very many cases actively, are engaged in dealing with public health matters, apart entirely from the regular physicians. During this period some \$9,000,000.00 have been spent in the construction of water works in ninety municipalities.

But further, twenty years ago there were but ten hospitals in Ontario receiving Government aid for 4,372 inmates ; in 1897 there were forty-seven hospitals and 19,372 patients receiving Government aid.

In 1880 there were two County Homes for the poor in Ontario; in 1897 there were fourteen; and where in 1880 there were twenty-three Refuges and Orphanages in the cities and towns, to-day there are forty.

Again, while in 1882 there were no contagious disease hospitals and very few separate wards for their treatment, there are to-day twenty-five contagious hospitals or separate wards in other hospitals regularly maintained for contagious diseases, while other smaller towns have buildings fitted up as temporary hospitals.

Even up to five years ago, and in some instances to-day, consumptives were treated in the general wards of our hospitals; to-day every new hospital and many of the older are preparing to place consumptives in separate wards.

Thus it will be seen that there has been a steady evolution toward the true scientific method going on in every one of these problems. The state and society have in their methods followed very closely upon the facts established by the experimental methods of science. The poor are rapidly being taken from the gaols and placed in rural Homes, and the street waifs in Industrial Schools. Small-pox, scarlet fever, and diphtheria are taken to contagious disease hospitals; and lastly, the consumptive is being placed in a separate ward. But at last and recently the next great step has been taken, and this time, as in most other cases, first by private philanthropy. As the evangelical Van der Broech was the first to establish near Hamburg the idea of the free colony for the unemployed by his school for boys and subsequently girls, and as pastor Kräenbuhl, the evangelist of Bratenberg, through noting the difference between those mountaineers of the Swiss Alps and the degenerate and physically weak who were in the schools of Berne and Zurich, was led to place a number of these street arabs in a school in the mountains, and saw that within a few months they were metamorphosed, and so was the originator of the mountain cure for consumptives in Switzerland, so twelve years ago private philanthropy established the Trudeau Sanitarium for Consumptives in the Adirondacks of New York State, and 1897 saw the Muskoka Sanatorium for Consumptives similarly established.

Surely this *resume* of the evolution of altruism in society and of state socialism, as governmental interference in social matters is called in Germany, in Ontario, and elsewhere is enough to authorize the statement that the movement for "Homes for Consumptives" now begun will see a rapid evolution in Canada within the next fifteen years. And the reason for them is simply that the situation demands them.

It is fifteen years since a report presented by its committee to the Social Science Congress of Great Britain on "Administration of Hospitals" stated, "There is a class of illness, which, refused admission to hospitals, is unsuited to work-house infirmaries. Such diseases are consumption, hip disease, and other chronic ailments requiring a lengthened treatment, country air, and surgical appliances are almost entirely neglected. Medical relief to be complete should effectively deal with these." This statement made so many years ago has had emphasis added to it every year since, and nowhere more than by the single fact that of 430 consumptives treated in the hospitals of Ontario in 1896, twenty-three per cent. of them died in the hospital, although their average residence there was less than fifty days. In other words they went to the hospital really to die.

Clearly then if the needs of the case are proven there only remains for us to show that a remedy has been found, and that there are practical means whereby such remedy can be provided. These are:

1st. Fight by all combined energy to prevent by education of the people and by legal enactments every cause inducing ill-health and thereby consumption. What these various causes are I have already indicated.

2nd. Assist in the removal of the cases, the sources of immediate infection, at the beginning of the disease from the small and poorly equipped homes and the factories and work-rooms where our less fortunate people reside and labor.

3rd. Build in every county or district "Homes" where at the early stage of this disease, when it is essentially one of malnutrition, those suffering may go, and by correct regimen, abundance of food, of fresh air and sunshine, of exercise, rest and sleep, main-

tain the fight against the destructive forces of the disease ; where they shall have a fair chance of saving their lives to their families and to the State, and at the same time be saved the danger of infecting those whom they love.

Take but a single example of what this means in a single city. From the Toronto death returns of 291 names of persons who died in 1896 of consumption 184 were between 15 and 60 years of age, and of these 52 were returned as "housewives." To none of us is there in the misfortunes of life any occurrence which seems sadder or which appeals more to human sympathy than the loss to children of a mother's care. Sadder still is the thought that through extending this to them to the last moment of her life she in many instances has become the innocent medium of communicating the seeds of this fatal disease before she has left them.

To see such "Homes" erected then must be the object of our efforts. How have the 47 general hospitals of Ontario been established? In almost every case by the efforts of the ladies of our cities and towns, supported by private subscriptions, and grants made by the municipal councils, supported by government aid. We have a large and most influential association called the Prisoners' Aid Association, which is ameliorating the condition of these unfortunates and getting many vagrants removed from county gaols to Houses of industry which they insist shall be established. Is the end to be attained not great enough to have, not necessarily a "Consumptive Homes Association," but the local councils of this association to make this scheme one of their chief fields of operation during the coming year. The Provincial Board of Health which I represent has for years been exerting its influence and not in vain to educate the public on the various phases of the causes and prevention of this fatal disease. It is to-day ready to aid by literature regarding desirable locations, method of construction, equipment and management, and is trusting to find allies, especially in this association, who shall bring local influence to bear in a matter which always has to have a local committee of "ways and means" in order to obtain results. I am further empowered to say that the Minister having under his charge the Provincial Department of Health is prepared to lend his influence to second in every way at his command the local efforts made for the progress of the work of establishing such "Homes."

At Christmas time in Toronto when I addressed the Local Council of Women on this subject Her Excellency promised the work her countenance and active assistance. In inviting me to speak to-night to the ladies of Canada she has indeed done more than this, for she has given me a chance to appeal to the hearts and the charitable philanthropy of the women of a whole nation. With these combined influences actively at work, seconded everywhere by the leaders of medical science in Canada, and supported by municipal and governmental aid, I already see the dream of many years fulfilled, and the greatest advance made which is possible in any field of Public medicine.

RELATIONS TO AND DUTIES OF MUNICIPAL AUTHORITIES REGARDING SANATORIA FOR CONSUMPTIVES.

An Address by P. H. Bryce, M.A., at a Public Meeting in Toronto, Dec. 12th, 1898.

MR. MAYOR, LADIES AND GENTLEMEN—Viewing the subject which is especially engaging our attention to-night from the position of a public officer, whose duty it is to study the causes of and to advocate measures for the prevention of disease, I have no hesitation in stating that in my opinion we have before us at once the most important and the most difficult problem which we as members of a complex society are required to deal with, viewed either from the social, the scientific, or the economic standpoint. We have to enquire into the manifold influences, which, year by year, cause almost one-seventh of the deaths in the population of our country and our city to result from the attacks of a single disease, manifesting itself in different forms, and to answer the question of whether we have not enough scientific knowledge of its origin and modes of progress as to be able to institute organized measures for its prevention or cure.

There has been placed in the hands of many who are present to-night a list of every death registered as due to tuberculosis which has occurred in our city during the years 1892 to 1897 inclusive, classifying these deaths by ages, sexes, and occupations; and a similar list, telling much the same story, can be made for every city in the land; and a still larger list, proportionately, for all the great cities of America and Europe.

First we observe in this list that a total of 2,290 deaths occurred, or 450 annually on an average. Of this total 404, or rather more than one-sixth occurred in the first year of life, caused by hereditary taint, unwholesome or tuberculized milk, infection from tuberculized mothers, and infected houses. Other 333 deaths occurred between one and fifteen years of age. The rest, 1,553 or more than two-thirds of the whole, occurred above this age; and nearly all, 1,421, between the ages of fifteen and sixty, or during the active wage-earning period of life, when lives are worth most to the State and their families. Indeed, were we able to exterminate this disease, we would save one-third of the deaths from all causes during this period, since comparative statistics tell us that consumption causes 37 per cent. of all deaths in the cities of the temperate climates of America and Europe between these years.

Second we further find that of the 1,555 deaths over 15 years, 191 occurred between 15 and 20; 256 between 20 and 25; 271 between 25 and 30; 214 between 30 and 35; 182 between 35 and 40, and 97 between 40 and 45. That is, 1,211 persons died during the years, when if married they would be rearing families.

Third, examining the list as to occupations we find 221 registered as housewives, of whom 168 were between the ages of 15 and 45, or 75 per cent. belong to the child-bearing period. Assuming all to have been mothers, they must have left behind them families of children averaging two at least in number, all young, many indeed being babes. To this list we have to add almost as many more in the list of those whose occupation is not given, or some 80 young families are left motherless every year in Toronto from this disease. A similar number of young families are left fatherless every year to swell the unfortunate number.

Fourth. If we investigate the table yet more closely and examine the occupations, we will find that at least 80 per cent. or four-fifths belong to our artizan and laboring, or wage-earning, class. Need I say what follows when the bread-winner ceases work and becomes a care instead of a help in a family? And what of the family when he or she is gone?

Fifth. Turning to the tables found in the government reports, we find a partial answer to these questions. In Toronto we have 8 orphanages, so classed in the reports. In 1897 these together had in residence 847 children at the beginning of the year, and during the year had let the most of them go for adoption or elsewhere, I know not where, but 812 more were admitted. Two regiments, each 400 strong, then are annually marched to our orphanages, most of them the indirect victims of this disease. Surely we have absolute proof in this that the disease reduces to the extremes of poverty our honest and industrious working classes.

Sixth. But what more do we find in these tell-tale government blue-books? This, viz:—that 19,617 persons were inmates of Provincial hospitals in 1897, or 2,100 more than in 1896, and of these 6,009 were in Toronto, the increase being 517. Were any of these consumptives, who, no longer able to be maintained at home, were sent to the hospitals at least to die in comfortable surroundings? This is what the reports tell us: viz., that in the five hospitals of the city some 369 cases of tuberculosis of the lungs and other organs were treated in 1897. With regard to the total diseases treated in the out-patient departments of our hospitals, I find it difficult to obtain the complete figures, but so far as I have received them they are as follows:—General Hospital 14,549, Sick Children's Hospital 3,366, St. Michael's Hospital 6,789.

I am only, ladies and gentlemen, in the brief time at my disposal, dealing with figures which are available to every one of you. The large-hearted philanthropy of the citizens of Toronto, of her municipal government, which between charities and health department spends \$90,000.00 annually, and of the Province of Ontario which spent last year

in Toronto \$42,998.60 make our own hospitals what they are, and have long been, our glory, and to our credit as a city. But need I ask you whether it has been wise philanthropy and good economics which have saved in 1897 as compared with 1891, 230 lives from scarlatina, diphtheria, measles and whooping cough and from small-pox? Have we not these sturdy, growing children—our future wage-earners—saved to us, and homes made happy by their laughter? If you agree with me in this, then a hundred times more must you agree with me that we must apply our energies, our time and our money to saving three times the number of lives of all those who died of these several diseases, from a disease which robs us of 300 wage-earners annually, makes us support 800 orphans, and sends hundreds into our hospitals, to die at least in decent surroundings.

Could we on the New Year's Day of 1899, give a home to the thousand persons at least, who at the present moment are tuberculized and living in Toronto; give to the many in the initial stages of this disease, a chance of life by sunshine, food, rest or regulated exercise, and we would find a year hence our list of able workmen increased by several hundreds, over two battalions of orphaned children reduced by one-half, the inmates of our hospitals and homes lessened, and our general happiness and prosperity notably increased.

It simply means transferring our energies and our funds to preventing what in all these several ways we are endeavoring at an enormous cost to ameliorate. I ask you, ladies and gentlemen, in the name of our suffering fellow citizens, in the interests of our national well-being, in order to enlarge the knowledge and power of science to prevent disease, and from the standpoint of ordinary prudence and common sense to take the first step to this end by establishing a citizens' sanatorium to cure consumption, and by removing the infected from the houses of our poorer people to prevent further spread of the disease.

But some one asks, is such saving of life possible? Can consumption be cured? Our answer is, such saving of life is possible. Consumption can be cured. But at what stage? I answer at the same stage when so many of our other severe, contagious diseases are curable, viz.: in its initial stage, early in the onset of the disease. Abundant statistics are available to prove that this is true. Dr. Weicker of Gorbardsdorf, of one of the oldest and largest sanatoria in Germany, states in his latest statistics that there have been eighty per cent. of established cures amongst the poorer class of patients sent by government insurance societies, with an average stay of but sixty-seven and one-half days. This marvellous result is due to the fact that these societies send patients at the earliest possible date. But taking the results of the Adirondack Sanitarium in New York State, now established thirteen years, for 1896 I find that 177 patients were in residence for various periods. Of the eighty-nine patients who remained from three to twenty-five months, or an average of eleven months and ten days, eighteen were incipient cases, of which fifteen were apparent cures, and three had the disease arrested; forty-five were advanced cases, of which five were apparent cures, and ten had the disease arrested; twenty-five were far advanced cases, of which none were apparent cures, and seven had the disease arrested. Thus the point of greatest interest is that, of the eighteen incipient cases, eighty-four per cent. left cured.

But the life-saving is especially to be recognized in the fact that these were sent for cure at a period in the disease before they were a serious menace to the health of their families. Statistics innumerable might be quoted of whole families swept away by this disease, but many present are familiar with several so recent illustrations in our own city that further illustration is not necessary.

Ladies and gentlemen, we have as fellow-citizens a present, urgent, imperious task laid upon us of lessening the misfortunes and sufferings of our working people, increasing the general happiness and prosperity, and removing serious danger to ourselves. Shall we not perform it?

PRACTICAL RELATIONS OF STATE HEALTH AUTHORITIES WITH RAILWAYS AND OTHER PUBLIC CARRIERS IN THE MATTER OF THE TRANSPORTATION OF CORPSES.

By P. H. Bryce, M.A., M.D., Secretary Provincial Board of Health.

TORONTO, July 10th, 1898.

Mr. President and Members of the Association of National Railway Surgeons of America :

GENTLEMEN :—In dealing with the subject upon which I have been asked to prepare a paper, it is necessary that we recognize several conditions which during the past twenty-five years have changed in the matter of the transportation of the dead, and which affect very materially the relations of public health authorities to this matter. The first of these is the enormous development in the facilities to transmit freight and express parcels of all kinds by rail, both as regards time and expense. 2nd. The well-determined cause of the origin of the principal contagious diseases, and of their methods of dissemination, and 3rd. The development along with such knowledge of the scientific means whereby the infectiousness of such diseases may be wholly or in a great part limited. Formerly the limited amount of travel between different sections of the country, the time and expense involved therein, necessarily made the number of persons dying away from home less than at the present time ; and the question of their transportation home, owing to these several reasons was a matter which would only occasionally be discussed. To illustrate how common the transportation of the dead has become at the present time, I give sub-joined the returns supplied me by the kindness of Mr. Quick, the General Freight Agent the Grand Trunk Railway : viz , of corpses shipped per G.T.R. May (1898) 151, and June, 1895. With such every day facts before us, it is evident that the social sentiment of our American communities tends to conform with the old idea, that members of families dying abroad, should be buried at home. As regards the transportation of bodies dead from contagious disease which necessarily becomes a question with which health authorities everywhere have to deal, it is apparent that the facts known for so long a time that contagion spreads from such bodies, necessitated the absolute prohibition of their transportation as the only means formerly known whereby public interests in matters of health could be considered. This may said to be simply an illustration of what was formerly known as a "shot gun" quarantine in dealing with outbreaks of small-pox, cholera and other similar contagious diseases. To-day, however, it may be said that in all States and Provinces where State medicine has become developed, these old methods have largely given way to a more intelligent and effective scientific quarantine, so in the matter of the transportation of the dead, we now must recognize the ready limitation of the spread of such diseases by the use of simple, yet thoroughly scientific measures, and the only question which would seem to remain for our consideration, whether as State Officers, Municipal Officers or Railway Surgeons, is, what practical organization is available for putting such methods into effect. There are three factors necessary for the solution of this problem, state and municipal regulations with authority and machinery for their proper execution, railways willing and prepared to carry out their share of the work, and the undertaker or person representing the individual of the community whose duty and desire is to see that his dead are buried, both in conformity with his wishes and the regulations of the State. In practice it may be said that no machinery, theoretically perfect in regard to dealing with contagious diseases, has always proved equal to the work to be done. To-day in several States, possibly in one or two States, the undertaker or embalmer is licensed, and by such license is assumed to be trained in all modern scientific methods for preparing dead bodies for transportation without danger to the public, and to be of such good standing in the community that it may in this particular trust its health to his care. For instance, the City of Chicago has licensed embalmers, divided, I believe, into grades, and upon these individuals the Health Department depends, along with the physician who has attended a patient who has died, for the safe carrying out of regulations, for the safe transportation of contagious disease. The following two communications illustrate what may happen occasionally, though perhaps not frequently as a result of dependence on such persons.

A letter of Dr. Sheard, M.H.O., Toronto, regarding scarlatina brought from Chicago.

TORONTO, April 12th, 1898.

Dr. Peter H. Bryce, Secretary Provincial Board of Health.

DEAR DOCTOR,—We have had a case of Scarlet Fever reported No. 53 Borden St., in the family of one Crompton. My Inspector on looking into the matter informs me that Alice D. Crompton, 3 years of age, came from Chicago on April 7th, and on April 9th was taken with Scarlet Fever and removed to the Isolation Hospital.

On March 24th, Guy and Marion Crompton were down with Scarlet Fever in Chicago, and attended by one Dr. Porter. Guy Crompton died on April 5th, and a certificate was given by Dr. Porter, of "Heart Failure." The body was brought on from Chicago and interred in Toronto on the 7th April. Marion Crompton is at present in Chicago and ill with Scarlet Fever. The Inspector was informed by the Cromptons that Dr. Porter gave them permission to come to Toronto.

In view of the trouble which we had with Scarlet Fever in the City of Toronto last summer, and the extreme liability to the spread of the infection, I think these facts ought to be presented to the Health Commissioner of Chicago, and with that object in view take the liberty of writing you in reference thereto.

Faithfully yours,

(Sgd.) CHARLES SHEARD, M.D.,
Medical Health Officer.

Dr. Bryce's letter to Dr. Reynolds, health officer, of Chicago :

TORONTO, April 13th, 1898.

Dr. Reynolds, Commissioner of Health, Chicago, Ill. :

DEAR DOCTOR,—I send you a copy of a letter I have received from Dr. Sheard, Medical Health Officer, of Toronto, regarding the appearance of scarlet fever, in a family reported as recently having come from Chicago. The cause of the transportation is apparent in the report of the physician, which gives "heart failure" as the cause of death. I shall be greatly obliged if you will have the facts enquired into, as to whether the child, Guy Crompton, who died April 5th, had been reported to your department as a case of scarlet fever. As you are aware, a representative of the State Board of Illinois attended the conference at Cleveland last June, where we were discussing the transportation of corpses by rail, and while the general feeling was that we wished to encourage transportation under proper supervision, it is clear that we must have such dependence on our undertakers that they will not be guilty of such violations of the law as that reported by Dr. Sheard.

Your obedient servant,

(Sgd.) PETER H. BRYCE,
Secretary Provincial Board of Health.

Dr. Reynold's reply :

CHICAGO, April, 1898.

P. H. Bryce, M.D., Secretary Provincial Board of Health, Toronto, Ont. :

DEAR DOCTOR,—Your letter of the 13th inst., with an enclosure from Dr. Sheard with reference to the fact that Alice D. Crompton, three years of age, was taken with scarlet fever on her arrival at Toronto from this city, and the fact that the body of Guy Crompton was shipped to Toronto with a shipping permit showing the cause of death to be "heart failure," when in fact it was scarlet fever is received.

Enclosed you will find copy of the death certificate filed in this office, which shows that the death was from scarlet fever, heart failure a contributing cause. You will also find a copy of the report of Dr. Gunn, Inspector of Funerals, and a report from Jas. J. Dillon, the Recorder of Deaths. From these reports it is evident that the body was properly prepared, and the cause of death given was scarlet fever and not heart failure. We must, of course, admit that Alice Crompton should not have been allowed to travel from a home where scarlet fever existed. I have not yet heard the full particulars from Dr. Porter, but an investigation is in progress, and he will be dealt with if we find he sanctioned the trip.

It is our custom to permit the attending physician, where he assumes to prevent the spread of a contagious disease, to have charge of the case. As a rule it works admirably. At present, however, it looks as though Dr. Porter had rather betrayed the confidence reposed in him.

I thank you very much for the information contained in your communication, and I am very glad to see that my native Province is taking such excellent care of the health of its citizens.

Kindly commend me to Dr. Sheard, and believe me,

Very truly yours,

(Sgd.) ARTHUR R. REYNOLDS, M.D.,
Commissioner of Health.

Dr. Bryce's reply to Dr. Reynold's letter :

TORONTO, May 3rd, 1898.

To Arthur R. Reynolds, Comm. of Health, Department of Health, Chicago Ill. :

DEAR DOCTOR,—I have to thank you very much for your letter of the 18th ult., regarding this matter. I have sent Dr. Sheard a copy of your letter, and trust that the matter has been satisfactorily explained.

Yours very truly,

(Sgd.) PETER H. BRYCE,
Secretary.

It will be quite apparent from this illustration that health authorities in granting that modern methods for the transportation of persons dead from infectious diseases are sufficient to protect the public health, and assuming that the persons, whose municipal authorities permit them to do this work of the preparation of the dead may be depended upon, must recognize that local conditions are much too varied for absolute trust to be placed in the thoroughness of the knowledge and work of undertakers taken as a class. Notwithstanding this fact, the public health authorities of different States and Provinces on the continent have by reports adopted at different meetings, recognized that the resolutions which were the outgrowth of the Conference held in Cleveland in June, 1897, between State Officers of health, Railway authorities and representatives of the Undertakers' Association are, if properly carried out, adequate in their judgment to the protection of the public health and for complying with the deep-seated social sentiment already alluded to.

For the convenience of members of the Association who may not have seen these regulations, I include them herewith. I may say that these regulations have, so far as Ontario is concerned, been approved of by the Provincial Board of Health, and only await the approval of the Lieutenant-Governor and his Executive in order to become law.

In the report of the Provincial Board of Health, which adopts these regulations, there is however, a very definite line of action deemed necessary for their proper execution. The report states :

(a) With a view to giving effect to these regulations, your committee has attempted to give practical expression to the views of your Board as expressed at the last meeting. In order to insure proper care and preparation of the bodies of the dead, prior to transportation, it is proposed that for the purposes of these regulations, the seventeen divisions into which the Province of Ontario is divided, for returning representatives to the Ontario Medical Council, be adopted, as the units for which one or more certified persons may be appointed to carry out the foregoing regulations of the Provincial Board.

(b) In order that persons certified may be fully qualified to carry out the regulations, your committee would suggest that examiners nominated by your Board be appointed, before whom candidates shall be notified to appear from the several divisions, and that in accordance with their standing on examination, they shall receive a certificate of qualification.

(c) In order that the greatest control may be practised in cases of dead bodies prepared for transportation, it is recommended that there be but one person named in each of the seventeen districts, who would be a resident in the district.

(d) In order that the matter may be properly regulated as regards expense, the Board would prepare a schedule in which would be included the cost of the travelling expenses, and of the preparation of the body for transportation ; while at the same time a provision would be inserted in the regulations governing the appointment, whereby a disputed account could be taxed in the matter of costs

(e) It would further be necessary to provide that a certified appointee could engage in work beyond his own electoral division only at the request of the appointee for such latter district, or in the case of the sickness or death of any appointee or in other emergency, the power to allow the passing from one district to another might rest with the Secretary of this Board. The latter methods to be alluded to by me further, with regard to the subject I present to you for discussion. To-day, practically no bodies dead of contagious disease, are transported by the railways of either the United States or Canada, and it must be apparent to the six hundred members of this Association, that where some 60 States and Provinces have a common railway system, where thousands of municipalities with their officials exist in these different States and Provinces, and where hundreds of railways exist under different management, that the State officer if he admits the practical possibility of transporting persons dead of contagious disease without endangering the public health within his jurisdiction, has to feel that there is behind him a common organization which is prepared to protect his public against the many possible accidents, which such diverse communities and interests involve. It may appear to the members of

this Association, that the time has practically arrived when such an association of trained scientific gentlemen exists, upon whom such a State officer can confide, viz.:—The Association of National Railway Surgeons. whose interests, it may be said, are those of the Companies they represent; but it might be that such gentlemen would at times fail to conform to regulations which might be detrimental to the temporary interests of their Company. I recognize on the other hand, however, by virtue of the scientific status of the members of this Association that they will require State officers to recognize that the best interests of the railways are consulted by the closest conformity to a system of regulations which ought certainly to be uniform in practice.

What can the members of this Association do to assist public health officers in this matter? I would say by advocating in those communities and States from which they come, by their most earnest efforts, the appointment of a number of expert and scientific members of the medical profession who shall be responsible to the state authorities for supervising the preparation in every case of the bodies of those dead of contagious diseases within their jurisdiction both within and beyond state boundaries, for transportation. There need not be many such, since it has been estimated that out of one thousand deaths in Ontario, dead of contagious disease, probably not more than 50 would die away from home. If such officers could be called upon by the undertaker in charge of the arrangements for a funeral, they would proceed to such point within their jurisdiction, supervise the preparation for transportation, and forward as is provided in the proposed Act and Regulations, a copy of the Transit Permit made in duplicate, to the central Health Officer of the State. By this simple method it appears that such regular control of the transportation of the dead over the whole continent becomes possible, since it will make it a simple matter to trace any unfortunate results growing out of any particular case immediately back to the responsible party.

I trust that this Association will give to this subject, not only such discussion as its importance deserves, but will by resolution and in such other way as it can, aid in bringing into practical effect, a work in which the Companies they represent are so greatly interested from the financial standpoint in the community they live in, and still more greatly interested from the public health standpoint.

REPORT ON THE IROQUOIS WATER WORKS.

April 19th, 1898.

By P. H. Bryce, M.D., Secretary Provincial Board of Health.

To the Chairman and Members of the Provincial Board of Health:

GENTLEMEN,—In consequence of the information contained in the correspondence herewith submitted between Dr. Harkness, Chairman of the Iroquois High School Board, and your Secretary, and of the results of the analyses of samples of water being supplied at the time thereof to the villagers of Iroquois by the Iroquois Water Company, your Secretary visited Iroquois on March 18th, and with the representatives of the Council and of the Local Board of Health investigated the whole question, and discussed the difficulties which have been thrown in the way of the Company, and the best means of having the pipe extended to the St. Lawrence River, so that a good and safe supply of water might be insured.

The diagram herewith submitted exactly represents the position of the river, the old and the new canals, and the waterworks, and also shows the alternate proposals for extending the water pipe into the clear river water.

At a meeting presided over by Dr. Stevenson, the Reeve, at which your Secretary met the members of the Local Board of Health and several members of the Village Council, the necessity for prompt action was pointed out, the main facts of the case being,

1st. That the water pipe of the public service has for some eight months had its intake in the canal, close to the present pumping house.

2nd. That the canal water as seen by the analysis, when it was covered with ice and was receiving no surface wash, showed an abnormal excess of organic matter doubtless from the shores and bottom.

3rd. That with the onset of Spring the canal has become a reservoir for the surface wash of the country along its route for several miles from Cardinal to Iroquois, and is polluted also by whatever local sewage flows in at Cardinal, and the very notable amount of wastes from the large starch works at that place.

4th. That the water was excessively filthy with mud at the time of the visit of your Secretary, and was beginning to be affected by the pollution incidental to the presence of hundreds of men and teams along the canal banks.

5th. That to this menacing pollution will shortly be added the effects of the mud stirred up by the wheels and screws of steamers going through the canal.

6th. That as the waters grow warm, the pollution will cause bacterial life to multiply rapidly, and should disease germs be present in such filthy water, there will inevitably be a serious outbreak of disease resulting therefrom amongst the users of the canal water.

7th. That the Water Company has, by the terms of its contract, to supply the village with a pure water for domestic purposes.

8th. That the works were established in 1885, without the plans being submitted to the Provincial Board of Health; and further, that the alteration in the source of supply made last year, of which the Provincial Board should have been notified,—in accordance with the Amendments of 1895 to the Public Health Act,—was not referred for approval.

9th. That the Local Board of Health of Iroquois has passed the following resolution, requesting the Village Council to take such action as will insure a safe public water supply.

“ Moved by A. E. Averell, seconded by W. J. Marsh, that owing to the impure condition of the water supplied to Iroquois, by the Iroquois Water Co., the Council of Iroquois be requested to take the necessary steps for procuring a supply of pure water from the said Company as soon as possible, and that the Secretary forward a copy of this motion to the Council Board.”

In view of the statements above recited, it is in the opinion of your Secretary urgent,

1st. That the Village Council, of the Village of Iroquois, take such steps as shall cause at once the extension of the intake pipe to the pure waters of the St. Lawrence.

2nd. That in view of this urgency, the Local Board of Health of the Village of Iroquois be instructed to at once give formal notice, based upon this report, to the Water Company, requiring it to abate nuisances and remove unsanitary conditions, as the Board is empowered to do under the Public Health Act,—being Cap. 248, R.S.O. 1897,—and to supply, within a definite, reasonable period, the village with a safe public water supply as required under the Act.

3rd. That the Local Board of Health be notified, in case action is not taken by it to have this danger to the public health removed within a reasonable period, that your Secretary be instructed to have such legal steps taken under the Public Health Act to have the unsanitary conditions above referred to removed, as may may be found necessary in the public interests.

In conclusion your Secretary would suggest that a copy of this report if adopted be filed with the Minister of the Department, one copy be forwarded to the Village Council of Iroquois, one to the Local Board of Health of Iroquois, and one to the Iroquois Water Works Company.

REPORT OF THE COMMITTEE ON SEWERAGE OF THE PROVINCIAL
BOARD OF HEALTH ON THE POLLUTION OF THE RIVER AVON
BY THE SEWAGE OF THE CITY OF STRATFORD,
WITH SUPPLEMENTARY REPORT.

Ottawa, Sept. 28th, 1898.

To the Chairman and Members of the Provincial Board of Health :

GENTLEMEN,—Your Special Committee appointed to investigate the pollution of the River Avon by the Stratford sewage begs leave to report that they visited Stratford on Sept. 16th and held an investigation enquiring into the matter, taking the sworn evidence of all parties appearing before them as witnesses by complainants for the Township of Downie, and also the evidence of the City Engineer of Stratford, who was called by your committee. The evidence of the City Medical Health Officer was also taken. The City of Stratford brought no evidence to show that the stream was not polluted, while the minutes of the meetings of the Township Local Board of Health for the eleven years past were put in as evidence to show that not only had the township health authorities protested against the continual pollution of the stream, but also that the Secretary of the Local Board of Health of Stratford had been present at a meeting of the Local Board of Health of Downie Township, in 1897, when a conference took place regarding the problem.

From the minutes and correspondence of the Local Board of Health of Downie Township it is clear that the protests regarding the pollution of the river have been continuous from 1887 to the present year, such correspondence being confirmed by copies of letters in the office of the Provincial Board of Health, notably that of Feb. 17th, 1898, by the Chairman and Secretary of the Downie Township Local Board of Health protesting against the extension of the City of Stratford sewers and the continued further pollution of the river, and several references in the annual reports of the Local Board of Health of Downie Township to the continued pollution by Stratford sewers of the waters of the Avon.

Further, as will be gathered from the correspondence which is found in the office of the Provincial Board of Health from Feb. 10th, 1896, to April 19th, 1898, the Provincial Board of Health is aware that the City of Stratford had asked for that Board's approval of its sewerage extension scheme, which, as will be seen by the correspondence of Feb. 13th, 1896, was given subject to the provisos found in the following resolution which appears in the minutes of the Provincial Board :—

FEBY. 13th, 1896.

The Committee on Sewerage submitted the following recommendations with regard to the proposed extension of the Stratford sewerage system. "That the construction of the proposed extension be approved, subject to the following conditions :—1st. That the main outfall sewer be changed according to the plans submitted. 2nd. That the extension of the system be on the plans proposed, one for carrying sink water, cellar water, house sewage and roof water. 3rd. That flushing tanks be a part of the system, to be placed in proper positions. 4th. That the provisions *re* storm water overflows into creek be approved of whenever the Engineer's report thereon shall satisfy the Board as to the efficient character of these storm overflows, the plans for which shall be submitted for approval to the Board. 5th. That the present method of disposal be permitted during the period necessary for the construction of the main line of trunk sewer to be completed during 1896. 6th. That during this period the City Council shall have decided upon some method for purification of the town sewage which shall be satisfactory to this Board, and that the construction of such filtration plant be proceeded with thereafter at the earliest possible period. 7th. That in connection with this extension a plumbing by-law to be adopted by the City Council after approval by the Provincial Board of Health."

In addition to this indirect evidence which is in the hands of your committee, there is the large mass of direct evidence herewith submitted by the residents along the Avon and others who have known it for years to show that the stream is a polluted stream.

With regard to the sources of pollution, the complainants produced witnesses to show that the County of Perth Court House and Gaol, the Collegiate Institute, the woollen mills of E. F. Dufton, were all directly polluting the River Avon by sewers carried from them

stream. The statements of the witnesses will be found in the evidence heretofore presented. Further, the evidence of W. F. VanBuskirk, City Engineer, of Stratford, shows that during the past eight or nine years some 5 or 6 miles of new sewers, intended for sanitary sewers, have been constructed, though as yet used largely for surface drainage. Further, that there is no available evidence to show that such are not used for draining privies and sink water, while there has been a gradual increase of the sewers. Further, the Engineer states that the G. T. R. shops discharge water into a tile drain emptying on St. Patrick Street by an old box drain into Romeo creek. Whether or not sewage enters the drain, it discharges as dirty water into the creek. He further stated that he was aware of sewers constructed by the city emptying into Romeo or Respeare Creeks, as that on Gore Street and St. David Street. In answer to further questions he stated that redress for Downie Township would mean not only the construction of sewage disposal works, but also enforcing connection between house and street of house drain now emptying into creeks.

From the correspondence and from the evidence of witnesses forming a part of this report, it is plain to your committee that the sewage from the City of Stratford, whether from the city sewers, the county buildings, the Collegiate Institute, Dufton's mills, or from private houses is discharged into the River Avon either directly or indirectly; and while there was no evidence produced to show that disease had been traced directly to this pollution, there is evidence which shows that cattle pasturing along the stream drank polluted water, which from inferences based upon the experience of those engaged in cheese-making, your committee believes must affect injuriously the quality of the milk products from such cattle.

To sum up the results of the investigation your Committee would say:

1st. That the report of the Committee of the Provincial Board of Health, dated June 1st, 1886, points out that taking the estimated consumption of water of the city of Stratford at 250,000 gallons, and calculating the flow of the Avon at between 5,000,000 and 6,000,000 gallons the sewage would form about 5 per cent. of the total flow. Evidence submitted shows that the consumption of water in August, 1898, was 659,596 gallons. Said report which was adopted points out that the pouring of sewage into the river must be considered as but temporary, and that the city must be prepared to erect sewage works whenever called upon by the Provincial Board of Health to do so.

2. That the evidence from the minutes of the Local Board of Health of Downie Township from October 1st, 1887, to February 15th, 1896, shows that the pollution of the Avon has been recognized as an evil which existed and which would increase annually.

3rd. That the correspondence and minutes of the Provincial Board of Health show that for the past several years the necessity for purification of the sewage of the city of Stratford had been realized by it, and that it had laid down as a condition of the sewer concessions by the city that satisfactory sewage disposal works were to be determined and approved by the City Council and submitted to it by the end of 1896, and that the Provincial Board of Health did in August, 1897, approve of the Engineer's scheme for sewage disposal by precipitation and filtration, and that the plans and details of such a scheme as modified by the engineer were submitted to the Provincial Board on April 19th, 1898, and after examination were finally approved of.

4th. That the sworn evidence of the City Engineer shows that such plans, while under consideration by the City Council of Stratford, have not been finally adopted, and that before such works can proceed the plans must be adopted by the Council and a by-law voted upon by the people.

5th. That in the opinion of your Committee the Provincial Board of Health should report to the Council of the City of Stratford that, as provided under section 30, of the Act, chapter 248, R. S. O., 1897, the Provincial Board does require in the interests of the public health, and notably those of the residents of Downie Township, the disposal of the sewage of the City of Stratford by sewage purification works, by such plans as have

been submitted to and approved by it, and that there seems no valid reason for del the part of the City Council, or any unreasonableness on the part of any person or sons, or municipality affected by the pollution by sewage of the river Avon, in se such legal remedy as is provided under the Public Health Act in Section 73, Cap R. S. O., 1897, for removing the unsanitary conditions created.

All of which is respectfully submitted,

(Signed). J. D. MACDONALD, }
P. H. BRYCE, } Committ
E. E. KITCHEN. }

*Supplementary Report of the Committee of the Provincial Board of Health on the
tion of the River Avon by the Sewage of the City of Stratford.*

Nov. 30th, 1898

MR. CHAIRMAN AND GENTLEMEN,—Your Special Committee begs to submit a Supplementary Report in addition to the Report adopted by the Board on Sept 27th, 1898, re the pollution of the River Avon by the sewage of the C Stratford.

The report of the Board's Committee then adopted contained five distinct concl based upon the evidence, each of which went to show pollution of the River Av the sewage of the City of Stratford. The Committee did not deem it necessary to tion specific instances of pollution in its conclusions, such as those of the County ings, the Collegiate Institute, or Dufton's Woollen Mills, since they all pollute the within the corporation limits, and on page 3 of the Report are shown to be s of pollution.

Inasmuch, however, as in the application made by the Downie Township Board of Health, these latter, as special sources of pollution, are asked to be in gated; and whereas it has been brought to the attention of your Board by the So for the Local Board of Health of Downie Township, that the recommendation o Committee contained in its fifth conclusion is that your Board do instruct the Council of Stratford to provide sewage disposal works, as your Board is empo to do under section 30, sub-sec. 4, Cap. 248, R. S. O., 1897; and whereas it desire of the Local Board of Health of the Township of Downie, as stated correspondence, to make application to the High Court, as provided under sectio cap. 248, R. S. O., 1897:—

Therefore, your Committee would recommend that the conclusions contain the Report adopted by your Board September 27th, 1898, be supplemented b following as section sixth:

6th. Your Committee does, therefore, advise that the Provincial Board of l do recommend the removal or abatement of the nuisances or things herein referred to, to wit:—the pollution of the River Avon by the Corporation City of Stratford, the pollution of the River Avon by those responsible for sewage lution from the County Buildings, from the Collegiate Institute, and from D Woollen Mills.

All of which is respectfully submitted.

J. D. MACDONALD,
PETER H. BRYCE,
E. E. KITCHEN.

TESTS OF EVIDENCE TAKEN BY A COMMITTEE OF THE PROVINCIAL BOARD OF HEALTH RE. THE POLLUTION OF THE RIVER AVON,

By the Secretary of the Committee.

Stratford, Sept. 16th, 1898.

The committee met at 2 p.m., when Dr. McDonald, chairman of the Provincial Board of Health, presented the reasons for holding the investigation.

Mr. Judge Woods for the township of Downie presented the reasons why the township authorities have made the demands for an investigation. He presented the township's efforts since 1886 to have the matter dealt with.

The map of the city was shown, Romeo Ward Creek being presented as a chief source of pollution.

R. LANG, City Clerk, (sworn):

Q.—Have you any documents in your possession in connection with these matters? A.—I have in my possession the minutes of the Council from the beginning, but the other documents, several from Dr. P. H. Bryce, have been destroyed.

Q.—Is there anything in the minutes of April 3rd, 1897, or thereabouts regarding communication with the Local Board of Health of Downie Township? A.—A communication had been received by the Downie Board of Health, but no minute of any action taken by the Council is found in the minutes.

Q.—Do you remember a meeting of the Downie Local Board of Health in October, 1897, at which you gave evidence? A.—Mr. Galbraith was sent to inspect the proposed system. He reported in favour of the proposed system, but as yet no change had taken place since 1884. Think the city and woollen mill has a good deal to do with the discoloring of the water. The mill nearest to is Duffton's mill. I have no doubt the evidence is correct, although I have no recollection of the incident.

(Signed) R. R. LANG.

Mr. Wood presented a map showing the course of the river.

MR. W. DAVIDSON, County Clerk, (sworn):

Q.—When was the Court House built? A.—The Court House was commenced in May, 1887, and completed in 1887.

Q.—Are there closets and urinals in the building? A.—Yes.

Q.—Do they drain into the Avon without any attempt at precipitation of the sewage? A.—No; and until a month or so ago we had no complaints regarding such pollution.

Q.—Is the communication dated August 1st, 1898, the complaint referred to? A.—Yes; although there is another subsequent notice which the solicitor, Mr. MacPherson, has.

Q.—Does the House of Refuge empty its sewage directly into the Avon? A.—No; it does so by means of a sewer into the city sewer.

Q.—Do you know where the city sewer empties? A.—It empties into a small stream which flows into the Avon.

Q.—Is there any process of purification before it empties into the stream? A.—None, except exposure to the air a few rods.

Q.—The stream into which the sewer empties is within the limits of the City of Stratford? A.—Yes, but enters the Avon some distance from the township. This stream is not always above the sewer, but is below.

By Mr. MacPherson:

Q.—What is the difference between where the Court House drain empties into the river and the limits of the Township of Downie? A.—I would say about a mile and a quarter, it being a circuitous course.

Q.—Would you say that in your opinion the fact of there being closets in the Court House would create a nuisance in the Township of Downie? A.—No; I would think not at ordinary times, although during the court there are many more persons using the building.

By the Chairman:

Q.—How many? A.—Seventy jurors say for four days during four jury courts. The other sessions are in session in December and June, the division courts monthly.

Q.—How many years were you mayor of Stratford since 1887? A.—Two years. I may further state that the sewer goes directly to the river as the County Council has been waiting for the construction of the city sewer, otherwise we would have put in a cesspool.

(Signed) WM. DAVIDSON.

ALEX. W. FISHER, (sworn) :

Q.—What is your occupation? A.—Reporter on the *Stratford Beacon*, and have with me which I produce copy of the *Stratford Beacon* of January 31st, 1887. Mr. Fisher read from the inaugural address of the mayor, Mr. C. I. Macgregor, in which the mayor referred to the subject of sewerage, that nothing had been done toward the construction of the main sewer, now that the county buildings are near completion, his idea being that the main sewer empty into the Avon near the cemetery.

Extract was read from the minutes of the City Council dated April 8th, 1887, stating that the Local Board of Health of Downie protested against the carrying of the city sewage into the Avon.

(Signed) A. W. FISHER.

PETER SMITH, Secretary Downie Local Board of Health, (sworn) :

Q.—What is your occupation? A.—I have been secretary of the Local Board of Health of Downie Township since 1885, when the Board was first organized.

Q.—How long have you resided in the Township of Downie? A.—I have resided in the township since 1867, some two and one-half miles from the river.

Q.—Have you any records of the Board relating to the pollution of the Avon? A.—Yes, minutes of meeting of March 30th, 1887, referring to Mayor Macgregor's address where it was proposed to empty the sewage of Stratford into the River Avon. After the subject was discussed the secretary was instructed to send to the mayor and aldermen, and a copy to the "*Beacon*" and "*Times*," notice that the Board will consider such action detrimental to the health of the inhabitants of the Township of Downie, and would strongly urge upon the City Council to adopt some other plan, as this Board will resist any attempt of such plan of sewerage.

Q.—Are there minutes of other meetings dealing with the matter, and if so can you supply the Committee with copies? A.—Yes; I shall do so, and with the following:—

Oct 1st, 1887.

March 3rd, 1888, (extract from report to Provincial Board of Health,) adopted by the Local Board of Health.

Sept. 28th, 1889 (extract from report to Provincial Board of Health,) adopted by Local Board of Health.

Oct. 29th, 1892 (extract from report to Provincial Board of Health).

March 16th, 1895 Minutes. These minutes were communicated to the City Council.

Feb'y 15th, 1895. The matter was discussed and a letter was sent to the Provincial Board of Health.

Q.—Have you received any communication from the City Council acknowledging receipt of communications? A.—None.

Q.—Did you cause the city to be notified this year, 1898, to discontinue? A.—Yes, through Mr. Mabey, solicitor, who was instructed by the Board at a meeting held on June 25th, 1898.

Q.—Did you receive notice to produce witnesses before Dr. P. H. Bryce in a letter from H. Bryce, dated Sept. 12th, 1898? A.—Yes.

Q.—Did you receive letter, submitted by you, from R. R. Lang, City Clerk, dated Sept. 7th, 1898? A.—Yes, this is the first and only communication from the city authorities to the township authorities in reply to their several communications. I have not replied to it and the township authorities have held no meeting with the city authorities with regard to the matter. No answer was sent as I received the notice from Dr. P. H. Bryce, dated Sept. 12th, before any action could be taken.

By Mr. McPherson :

Q.—You cannot say personally that you know of the pollution of the river, or of anyone's health being prejudicially affected by the state of the river. A.—I cannot give evidence of such pollution or of anyone injuriously affected.

Q.—Who was Chairman of the Board of Health in 1885 and 1886. A.—Mr. Lang

Q.—Was Mr. Fram a member in 1887? A.—Yes.

By Mr. McPherson :

Q.—Have you ever complained to the County Council regarding the connection between the County Building and the river before August, 1898? A.—Not to my knowledge.

By Mr. Woods :

Q.—Was there three or four years ago an outbreak of typhoid and diphtheria in the township? A.—Yes.

By Mr. Woods :

Q.—Do you know that such was not due to the pollution of the river? A.—I could not say whether it was or not.

Q.—Do you know Wm. Woods in Downie Township? A.—Yes.

Q.—Were there cases of typhoid in Mr. Woods' family at that time—whose place is near the river? A.—Yes, I knew of one case.

Q.—How far is Mr. Woods below the city? A.—It is on lot 10, con. 5, or 4 or 5 miles around by road.

Q.—How near is the house to the cheese factory and piggery? A.—About 45 rods, and about the same from the piggery.

Q.—Is this cheese factory and piggery one which has been referred to in reports to the Provincial Board of Health? A.—Yes.

(Signed) PETER SMITH.

R. H. PACKHAM, (sworn) :

I reside on lot 4, concession 2, adjoining the city corporation.

Q.—How long have you resided there? A.—For three years past.

Q.—Does the river run near your farm? A.—Yes, within 25 rods of the house.

Q.—Are there many in your family? A.—Only my wife and myself.

Q.—How long have you known the river near where you reside? A.—About 15 years.

Q.—Can you say there is any difference in the appearance of the stream since you have known it? A.—I do not think it as clear as when I went there three years ago.

Q.—What difference have you noted? A.—It is often bad-smelling, muddy looking, and with a scum on it; sometimes it is black.

Q.—Do you know what this is due to? A.—I believe it due to the sewage and the woollen mill.

Q.—Will your cattle drink the water? A.—Yes, if they cannot get better, but they prefer well or spring water.

Q.—Are there growths along the shore that used not to be there? There is a slimeiness along the shore and abundance of weeds.

Q.—Is this a slow running stream? A.—When low it is slow, not more than 6 inches deep, and at one place not more than 5 feet wide. This is on my farm.

Q.—How far do you live from the nearest sewer outlet? A.—A little over 100 rods.

Q.—Do you live near the island on your farm? A.—About 30 rods. The river is narrowest at the island on my side, but the stream is wider on the west side of the island.

Q.—Do you use water from the river? A.—No.

Q.—Where is your well? A.—It is higher than the river and has a depth of 25 feet.

Q.—Have you ever smelled bad smells at the house? A.—No; but if you go near the river in the evening in summer there is a bad smell.

Q.—Have you had any sickness which you attributed to the river? A.—I cannot say that any of my family have been injuriously affected from the river.

Q.—Are you in the dairy business? A.—No, and do not use the water from the river.

By Mr. Woods :

Q.—Is the outlet of the sewer spoken of by Mr. Davidson, on the lot next yours into a living stream? A.—No; I have seen it running quite freely in spring, but pretty well dried up in summer.

By Mr. McPherson :

Q.—Have you known typhoid or diphtheria near you? A.—No, but some cases further down the stream. I have springs on my place, but if I had not I would not like to use the milk from cows drinking the river water.

(Signed) R. H. PACKHAM.

WILLIAM WOOD, (sworn) :

I am a farmer residing in Downie Township.

Q.—Where is your house? A.—It is above the cheese factory. I have lived there 59 years. The Avon was known as a trout stream with lots of fish. I used to drink of it often as it was clean then. Now it is dirty, has dirt accumulating on top of it, which looks like a thick scum. This is wherever there is an obstruction, and if stirred up there is a terrible smell. It is worse in low water in summer, but is not as bad since the rains came. The river water rises and falls daily.

Q.—Have you springs? A.—No; I have to use the river water for the cattle as I have no springs. Where the water is stirred up the smell is like a privy. The horses seem to dislike the water.

Q.—Have you ever had typhoid in your family? A.—One of my girls came home with it from the neighbors who lived on a farm not far away where there were other cases.

Q.—Have you had sickness directly attributable to river water? A.—No.

Q.—Do you supply the cheese factory with milk? A.—At times.

Q.—Do the cattle stand in the stream? A.—Yes, much in hot weather and fly time.

Q.—Do their udders become soiled? A.—I have not noticed it specially.

Q.—Do you think it good water for the cattle to drink? A.—No, not from the amount of filth present.

Q.—How long since you drank water out of the river? A.—Not since I went to school.

Q.—What was the river like in 1885? A.—Very different from what it is now.

(Signed) WILLIAM WOOD.

H. A. SOUTHWICK, (sworn) :

I am a cheese-maker and proprietor employed in making cheese at the factory lot 11, con. 6 in Downie Township.

Q.—How long have you been there? A.—Since 1885.

Q.—Is the river clear above the factory? A.—No, it has been in bad condition this summer for cattle to drink. It is oily looking, at other times green, at other times contains lumps of matter which would stop behind any obstruction. This is the case as it comes over a gravelly bottom past the factory. The water is about 5 feet wide at this point and 8 inches deep. The factory is about thirty feet from the river. I have not noticed smells from the river while in the factory. I get milk from farmers whose cattle drink the river water. Some of them are on farms nearer the city than is the factory. The factory is six miles from the city. Much whey is sent home in cans. There is a pig pen some 350 feet from the factory and 30 feet from the stream. We keep 50 pigs. The drainage is not from the pens into the river.

Q.—Has your experience been that the milk from cows which drink or come in contact with such polluted water as that described by you in the river Avon is affected unfavorably? A.—Yes, my experience is that milk from such cows takes on a bad flavor. I have sent home milk with such bad flavor coming from such cows.

Q.—Have you a large family? A.—Four of a family and two men. We have had no sickness for several years past.

Q.—Have you noticed during the fifteen years an increased pollution of the river? A.—It has been more polluted this spring than I ever saw it before.

Q.—(By Mr. McPherson). Who was it whose milk was returned? A.—I am not prepared to say. At least one person's milk.

Q.—Do you know of anyone's health being affected by the polluted milk? A.—No.

(Signed) H. A. SOUTHWICK.

THOMAS DUNN, (sworn):

I am a farmer and reside on lot 5, con. 2, Downie Township, adjoining the corporation of Stratford. The river Avon runs through the south-east corner of my farm. I have lived on the farm for 52 years. It was then a clear trout stream fit for drinking purposes. Now it is filthy. I see no fish except in spring. I attribute the state of the river to the filth of the town of Stratford. Am about a mile and a half below the town. The appearance of the river when filthy is a green scum all over it, as in hot dry weather. It smells badly at times. The scum was not on the river years ago. The water on the stream above Stratford is not the same as it appears on my farm. My cattle drink and stand in the river. I have never noticed any difference in the milk since the cows go to the stream. I think, however, that the stock have not thrived as well. Last year I found a two-year old dead on the bank of the stream. I do not know what caused its death.

Q.—How many cattle have you? A.—Some 22. Have springs, and two wells and troughs. About one-half the cattle shut back and have access only to the river. These are the young cattle. Q.—How far is your home from the river? A.—About 40 rods. I have noticed a fog rising from the river some nights, producing a disagreeable smell.

Q.—(By Mr. McPherson). Have you known anyone's health to be affected by the river? A.—No. A few of my cattle were sick last summer (1897). We kept them in gave them a little medicine, and kept them from the river water till they were better.

(Signed) THOMAS DUNN.

R. A. BALLANTYNE, (sworn):

Am a tenant on the farm, lot 10, con. 4, Downie Township, the next farm on comes near the cheese factory. The river runs through the farm. Do not live there. I do not consider the river water fit for cows to drink. There is a scum on the water where it is still; a greenish growth. My horses won't drink it. The stream is about 20 or 30 feet wide and one or more feet deep above the cheese factory.

Q.—(By Mr. McPherson). Have you heard of anyone's health suffering from the water? A.—No, but know of no one ever drinking the water. I have bathed in the river once this summer, but it was not very clear or very deep.

(Signed) R. I. BALLANTYNE.

STRATFORD, Sept. 17th, 1898.

The Committee met at 10 a.m. in the Court House.

DR. J. A. ROBERTSON, Medical Health Officer, of Stratford, (sworn):

Have been Medical health Officer for eight or ten years. Did in June last make report to the Local Board of Health on the matter of the sewage disposal, urging that the Council adopt some suitable means of treating the town sewage. I am not aware that the Board has received any reply from the City Council. The total houses in the city are probably 1,500 at least. There has been public water since 1885. There are 150 to 200 water takers.

Q.—What is the number of water closets? A.—I am not aware how many water closets are established in the town.

Q.—Can you tell the Committee how the house sewage is disposed of? A. House drains which carry sewage and all house slops empty in some cases into the town sewers, and in others into the open ditches along the street, also into Romeo Creek. All of the creeks and drains lead to the Avon. Romeo Creek has been from time to time deepened, principally to prevent weeds and to make a better outlet for cellar drains. The same deepening has been made use of by some householders for receiving sewers from houses with water closets and house sinks.

Q.—(By Mr. Wood). Do you know the creek near the Collegiate Institute? A.—Yes, I have noticed smells along it in the evening.

Q.—Do you think Romeo Creek from Erie St. to the outlet in a sanitary condition? A.—No, as it is used as the outlet for privies, and house drains.

(Signed) J. A. ROBERTSON.

ROBERT PEARSON, (sworn):

Have been caretaker of the Collegiate Institute for 10 years.

Q.—You live in the building with your family? A.—Yes.

Q.—You know the creek near by? A.—Yes.

Q.—Is the neighborhood savory or unsavory? A.—It is very bad smelling at times.

Q.—How many pupils and teachers are there? A.—200 pupils, and 7 teachers.

Q.—How many members in your family? A.—There are 8.

Q.—When was the method of disposal of the sewage of the building changed? A.—About 2 years ago. Before that there were outside closets. When these were done away with closets were put in and a drain laid from them to the river.

Q.—About what is the distance? A.—About 300 feet.

Q.—Do you know of any obstacle why proper receiving tanks should not be put in and the sewage purified? A.—No.

Q.—Do the house sinks connect with the closet drain? A.—No, they are laid to the river by separate drain.

By Mr. McPherson:

Q.—Does the bad smell arise from Romeo creek or from the river? A.—It arises from the creek on the south-west side, the collegiate drain enters the river about 50 feet from the mouth of the creek.

(Signed) R. H. PEARSON.

THOMAS WOOD, (sworn):

I am a farmer and live on lot 13, con. 5, Downie Township. I live just below the cheese factory, about one farm below Mr. Wood's farm. There is no noticeable difference between the river at his place and mine. The river at my place is different at different times of the year. In July and August when the water is low there is a dirty green scum at any eddy or obstruction. A greyish substance sticks on the stones when the river is low. Rain water takes this away. There is a smell in the evening at times, and there is often a disagreeable smell in the morning. I was born on the farm. The stream used to be a clear trout stream. I have gone fishing and seen two-thirds of a patent pail of trout caught. There are no trout now, and I do not think they would like the stream.

Q.—Do your cattle use the stream for drinking? A.—They usually go to the spring trough, although I have seen them drink out of the river. I do not think the water healthful for the cattle. They stand in the stream in hot weather. I was talking with a ferrier about my cattle with sore eyes. I think the flies cause the sores, and then the cattle in the stream splashing the water on the sores tends to make matters worse. The veterinary surgeon thought this would tend to make them in the state they were. I do not send milk to cheese factory. I am not aware of any sickness in persons I know of as due to the stream.

(Signed) THOMAS WOOD.

JOHN PETHICK, (sworn):

I live on lot 3, con. 3, Township of Downie. I have lived on the place during the last 20 years, and have been in the township since a boy. I have known the stream since a boy, and it was then as clear as any stream I ever saw. I know it was a trout stream at one time. The river water this summer has been in a filthy state. At times with a width of a rod or more you could not see the water for the filth on the surface. I have seen it worse in places where the river is sluggish.

Q.—How is the river at Hoontin? A.—I do not know. The school I attended was near where the cheese factory now is. The river does not look so bad now that the rains have washed the stream out. When the mass which collects gets going with the wind it goes down the stream in lumps. I have taken a pole and broke up a mass and found a stinking smell like a closet. This is worse on some days than others. Worse on a dull, foggy morning.

Q.—Where is your house? A.—My house is 40 rods or so from the stream and we notice the smells coming up from the river at times as far as the house. It is the same smell as down at the river. My cattle will not use the river water. I send milk to the factory.

By Dr. Kitchen :

Q.—Have you known of milk being returned on account of this stream? A.—No; but I do know that milk has been brought home by my boy who drives, as not being fit for making cheese. The land along the river valley is all pasture land, and considered the best by all the farmers.

Q.—Do you know of any sickness caused by the river water? A.—I cannot say that any sickness in my house or neighborhood has been caused by the river.

Q.—Who is your neighbor? A.—Forbes Edmunds.

Q.—Do you know that he had two cases of typhoid fever several years ago? A.—Yes, but I do not know the cause.

(Signed) JOHN PETHICK.

WILLIAM CLAWSTON, (sworn):

I live on lot 7, con. 3, of Downie. I have lived on the said lot since I was born. Am next up the stream from Mr. Pethick.

Q.—You heard Mr. Pethick's evidence as to the stream? A.—Yes; I agree with him, but I think it worse than he made it. The grey matter is like he described it. I have not noticed any oily stuff at Dunn's bridge. The river is dirtier than it ought to be.

Q.—Do your cattle drink the water? A.—I do not think the water good for cattle. My cattle do not like to drink it, though they have to drink it as I have little else. The water now is much worse than it was ten years ago. It is getting worse all the time. It often has an offensive smell, bad when stirred up. I have smelled it as far as the house occasionally. We live 40 or 45 rods away. The grey matter is like refuse from water closets cleaned out.

By Mr. McPherson :

Q.—You are in sight of Dunn's bridge? A.—Yes.

Q.—You have seen boys bathing there often in warm weather this summer? A.—I bathed once this summer in the river when it was clearer than usual, but it was not fit for use. Our cistern was dry.

(Signed) WILLIAM CLAWSTON.

GEORGE FRAME, (sworn):

I am a farmer and reside on lot 15, con. 4, Dowie Township. I am now member of the Local Board of Health of Downie, and was member of the County Council in 1887. I was not a consenting party to the sewage from the county buildings going into the Avon, and stood for earth closets at the time, as the people down the river were complaining of sewage in the river. I have always been interested in the state of the river. I saw it two days ago just outside the boundary of the city for half a mile, and it ran along like whey and not like water at all. At Dunn's bridge I see it occasionally and it does not appear well. I do not think the water fit for anything, much less to drink. I know there has been since 1885 an objection to the pollution of the stream by the farmers of Downie.

(Signed) GEORGE FRAME.

GEORGE WOOD, Reeve of Downie. (sworn):

I am chairman of the Local Board of Health in the place of Mr. Lang, who has retired from ill health. This is my second year as reeve. Was in the council before. There were protests to the city for years against the pollution of the river. I do not live on the river, but see it occasionally. When I have seen it in July and August it looked bad. I would not like to have the water used, and would not like a farm on the river, for it is of no use to a man, it is an injury. I am not sure of any cases of contagious diseases occurring along the river which the Board had to deal with, except one case this summer, but do not know the cause.

(Signed) GEORGE WOOD.

JAMES CLYNE, (sworn)

I reside in the Gore of Downie. Have been member of the Local Board of Health since 1885, since organized. Have had to do with school water, cheese factories, and pollution of the Avon. I know that protests against the pollution of the river have been continuous for years. General complaints have been made against this pollution. Twenty years ago it was a clear, fine stream; for ten years it has been a polluted, dirty stream. I have recently seen it above the city and it is as clear as it once was below. I know good water, as I live on a clear spring creek.

By Mr. Smith :

Q.—How long since the stream was in a filthy state? A.—Have noticed that during the last fifteen years it has been getting worse.

Q.—Is it worse in low water? A.—Yes.

Q.—Do you know the cause? A.—Yes; I think the sewage from the City of Stratford explains it.

Q.—Have you seen it often? A.—Yes, occasionally.

Q.—You base your evidence on the casual observation of the river? A.—Yes, from the materials I have seen in the river in the city, I think its condition is explained.

(Signed) JAMES CLYNE.

THOMAS STEELE, (sworn) :

I live on lot 21, con. 10, of Downie. I am a member of the Local Board of Health, have been for three years.

Q.—You are aware of the complaints regarding the river? A.—Yes; I have therefore given the matter attention. I have frequent occasions for observing the river and have seen it at different points at different seasons of the year. In general terms I would say that the water of the stream where I reside will compare favorably with other streams. There is more than 10 miles of river from Stratford at Avonton. I never could notice pollution, but there was complaint made to me of smell at that point. Farther up the nearer you get to Stratford the river is more polluted. 3 weeks ago I went by Dunn's Bridge to inspect the river. Its appearance was very bad. Mass of solids in the running water. This cakes in stagnant water. You could not see the water under the scum. The smell was bad. I remember crossing between the cemetery and the hospital some three years ago. I saw a similar collection on the water and the water was dark and oily. In fact the nearer you came to the city the greater seems the pollution, and as the last witness stated the farther you get above the city the clearer the river gets.

Q.—(By Mr. Smith). Is there not a mill in Stratford which pours much inky matter into the sewer? A.—Yes; but I do not think this accounts for the solid matter floating on top.

(Signed) THOMAS STEELE.

The minutes of the Local Board of Health of Downie were handed to the Provincial Board of Health for reference.

W. F. VANBUSKIRK, C. E. (sworn) :

At the request of the Committee of the Provincial Board of Health said :

Have been City Engineer of Stratford for one year, but have lived in Stratford for about three years and have done occasional engineering work during the last three years for the city. My duties include all new work, its design and construction, and general adviser to the Council. There are some 5 or 6 miles probably of new sewers constructed within the last 8 or 9 years, designed for sanitary sewers, but so far have been used principally for cellar drainage and street water. Heretofore private parties have been in the habit of connecting house cellar with sewer without permission in many cases, but in others permission to tear up road is obtained from the Street Commissioners. No records have been kept of drains put in on permits, but we do now. Cellar drains constructed latterly have been of vitrified pipe. There is no available information as to whether such tile drains are not used for draining privies and sink water. The number of water closets is small and must be because the water service is small. There are not probably more than 200 houses supplied with public water service. There has been a gradual increase of house sewers. The City Water Co. supplies water to the railways and the shops which employ some 600 hands. There are only privy vaults so far as I know at the G. T. R. workshops. A large amount of the water from the shops comes into a tile drain emptying on St. Patrick St. by an old box drain to Romeo Creek. This water is used for washing boilers they tell me, and I have an idea that there is a urinal connected with it, but I do not know for certain. It at any rate arrived in the creek as dirty water. There are several factories employing a number of hands in the city. I have no idea how many house connections have been made between water closets and sewers, but there are hotels and other buildings connected.

Q.—Is there at the present time any scheme which has been adopted by the city council for the treatment of the sewage of Stratford before allowing it to flow into the Avon? A.—There is a scheme drawn up by me last month under instructions of the sewerage committee of

council for disposing of the city sewage. The plans were before the Provincial Board of Health, and the scheme is at present under consideration by the city council. I am not aware of any objection having been made by the Provincial Board of Health to the prosecution of the scheme.

Q.—What steps are required now for carrying out this work? A.—The adoption of the scheme by the council, and the submission of a money by-law to the people.

Q.—How long would be required to have such a by-law submitted? A.—I think it requires advertising for about a month.

Q.—Could the work proceed in winter? A.—Not very well, the greater part could not be done in winter.

Q.—(By Mr. Smith). What has been the cause of the delay in the adoption of some scheme? A.—The city's sewerage committee which has been studying the question of sewage disposal have been under the impression that there was no hurry owing to the small number of sewer connections.

Q.—(By Mr. Smith). When did you report to the council your scheme for sewage disposal? A.—About the end of June, 1898.

Q.—Do you remember a deputation appearing in February, 1896, before the Provincial Board asking permission to extend and alter the sewerage system of Stratford? A.—As I was not there I could not say positively.

Q.—Are you aware that the extension made in that year was dependent upon the council having arrived at some plan for the disposal of the sewage by the end of the year? A.—Yes, the deputation went to get permission to make changes in the outlet and others, which were proposed by me. These changes presupposed a method of disposal of sewage by gravity instead of by pumping. The council at that time was satisfied that the sewage could be disposed of on a farm, but I practically condemned the scheme as I found there was not sufficient area for precipitation at a reasonable cost, and so have advised a system of sedimentation and filtration.

Q.—Are you aware that such a scheme has been practical elsewhere? A.—Yes, and can be constructed at a reasonable cost. (In answer to Mr. Smith) The city council has not allowed the matter to drop long.

Q.—(By Mr. Maybee.) Do you know of any sewers constructed by the city emptying into Romeo or Shakespeare creek? A.—Yes, one on Gore St. built some three or four years ago. It is nearly one half mile long and empties directly into Shakespeare creek. I do not think there are many house connections because the sewer is perfectly dry sometimes in summer.

Q.—What others? A.—An old sewer on St. David St., a box drain built twenty-one years, empties into Shakespeare creek.

Q.—What others? A.—John St. sewer empties into the river. Has not very many connections for its length.

Q.—What others? A.—About all the others enter the main sewer.

Q.—Do you know of sewers from buildings emptying into these streams which could be connected with the city sewers. A.—Yes, I know of several.

The redress for Downie township would require not only sewerage disposal works then, but enforcing new sewer connection between houses and sewers instead of into creeks, and also leading some existing sewers into the trunk sewers, and also a large extension of the lateral sewers on the Macdougall plan, and the prevention of pollution by dumping garbage and refuse into the creeks and river. A.—Yes.

Q.—What would be the cost of completing the trunk sewer along the south side of Victoria Lake from the skating rink to the main outlet sewer as per plan. A.—About \$2,500.00.

Q.—This money raised by by-law some two or three years ago by debentures is available for the purpose is it not? A.—Yes.

Q.—Is there any reason for this work not being done? A.—No local demand for its completion, and other work was pressing.

Q.—Would the sewer intercept the sewage now going into the pond and river? A.—Yes, such as the collegiate institute, the court house and gaol, Dufton woollen mills, and government buildings.

Q.—What buildings on Ontario St. drain into the river and pond? A.—Only the Post Office.

Q.—Do you know where the sewage of the Gordon Block goes? A.—I have not followed the pipes in the building.

Q.—You put down a sewer on Market St. last year? A.—Yes, but the only connection with that from the Gordon Block was one under Mr. Hardy's store.

Q.—Do you claim that all private water consumers have water closets? A.—I do not know.

Q.—Some of these water consumers use cess pits? A.—Yes.

(Signed) W. F. VANBUSKIRK.

Mr. Mabey submitted table of pumping of water works as follows :—

June, 1898.....	605,838 gallons.
July, 1898.....	662,829 gallons.
August, 1898.....	659,596 gallons.

Mr. Judge Woods further said :—Dealing with the main sewer will by no means remove the evil. The township has tried twelve years to get redress and could not. We hope that the report will bring home to the people that the township has striven in vain.

Mr. VanBuskirk presented the committee with a copy of the city map.

The above evidence concluded the investigation.

REPORT RE PORT DALHOUSIE DRAINAGE NUISANCE.

By the Secretary.

TORONTO, June 29th. 1898.

To Dr. Considine, Medical Health Officer, Port Dalhousie, Ont.

DEAR DOCTOR,—In compliance with the request contained in your letter of the 8th inst. I beg to report that I visited the Village of Port Dalhousie on June 22nd, and in company with yourself, the Reeve and several other interested parties examined the several places complained of as nuisances from local drainage. In both instances I found the complaints borne out by facts, and see no way of an effective and permanent remedy except by the construction of two drains under the local improvement clauses of the Municipal Act, being sections 668 and 669 of chapter 223, R. S. O. 1897. The Public Health Act directs that the Local Board of Health abate nuisances, and this is the ready way of having the work done and the cost assessed.

I would therefore advise that,

1st. A 6" glazed tile sewer be laid along Main Street at such a level as will be out of danger of frost, and so that a flush may be readily be supplied to it, in the absence of regular water works, from the canal basin.

This work must be done by the corporation, leaving an offset for house drainage to each lot, and thereby the householder will be enabled to make a four-inch tile drain connection properly trapped to his premises. I forward a copy of our Model Plumbing By-Law for adoption by the Council as a Village by-law.

2nd. A similar drain should be laid down the Ravine at the back of the stores on Main St. to the canal for the drainage of the properties contiguous. In addition to the sections of the Municipal Act already quoted, I refer you to section 673 expressly dealing with the distribution of cost of local improvements.

I further advise the Council to employ some engineer accustomed to dealing with the local assessment of land drainage, both to make a plan and supervise the construction of these sewers as well as to report on the properties to be assessed.

I shall be pleased to learn that the beginning has been made of a sewerage system for the town, which with a little energy might be made cleanly and attractive for many summer visitors and healthful for its own inhabitants.

Please lay this report before the Local Board of Health and the Village Council as soon as possible.

REPORT *RE* LONDON PACKING COMPANY NUISANCE.*Toronto, Jan. 26th, 1898.**To the Members of the Provincial Board of Health.*

GENTLEMEN,—Your committee to whom was delegated the duty of inspecting the establishment of the London Packing Co., in September last, reported at the last meeting of the Board that they had proceeded to Pottersville, London Township, and had taken evidence on September 14th 1897; and further that in view of the verbal opinions then and subsequently expressed, regarding the method of removing the cause of further complaints, and the statement made in a letter by the Manager Mr. Ginge, dated Oct., 8th 1897, that he was then taking steps to carry out the Board's expressed opinion, that by an elevated tank, the effluent from the factory, might be pumped and then run by gravity to the lighter land of the field, there to be utilized as a sewage farm, your committee did not deem any more formal report necessary.

Inasmuch nowever, as information has been received both from the Reeve of London Township, and Mr. Shore, M. P. P., during the last month, that the company has as yet taken no action towards carrying out the proposed improvements, your committee does now beg leave to report.

1st. That it finds from personal investigation in both June and September, 1897, that the disposal of the waste effluent from the factory, was not of a satisfactory nature, and that both an aerial nuisance exists, and that the creek was notably polluted below the factory.

2nd. That the sworn statements of different witnesses further give evidence that such conditions of nuisance are more or less constant, and that the then existing modes of disposing of the effluent from the factory, were insufficient to prevent a recurrence from time to time of the nuisance.

3rd. That in the opinion of your committee, the abatement of the nuisance especially complained of, viz., the polluted waters of the creek, demands that the effluent wastes be discharged on a much larger area of land than at the present for filtration, and at a distance farther from the border of the stream

4th. That in the opinion of your committee, the proposition contained in the letter of Mr. Ginge, the Manager, will be a simple and efficient mode of abating the nuisance, provided that the land used is kept deeply ploughed and permeable to air, and that after every discharge into furrows, the furrow be turned over the wastes by which the absorption of the gases of putrefaction will be complete.

5th. While subsoil drainage would increase the porosity of the soil and its ability to deal with the wastes, the necessity for this is a matter of detail depending upon the area of land used, and the amount of the daily sewage.

6th. That the beneficial effects of the utilization of sewage of the London Asylum, and solid refuse from the packing factory daily hauled to the Asylum gardens leave your committee no room for doubt, but that the cost of the disposal of the effluent wastes from the factory can be practically made up by the increased produce from the sewage farm.

7th. That in the opinion of your committee, the Local Board of Health will now be justified in taking action as provided under section 64 of the Public Health Act, subsection 2 in seeking an Order of the Court to compel the Canadian Packing Company to at once introduce such methods as will abate the nuisance.

All of which was respectfully submitted.

(Signed) J. D. MACDONALD,
E. E. KITCHEN,
P. H. BRYCE.

INSPECTION OF OAKVILLE SLAUGHTER HOUSE.

By J. J. Cassidy, M.D.

Toronto, August 10th, 1898.

P. H. Bryce, Esq. M.D., Secy. Prov'l Board of Health, Toronto, Ont.

DEAR DOCTOR,—I went to Oakville on the 6th inst. by the 2.10 p.m. train, I called upon Mr. W. S. Davis, town clerk, upon my arrival, and he accompanied me to the spot where the nuisance complained of was said to exist. (see Mr. Davis' map). The Public and High School is a large building of two stories, situated on Main street, and the rear portion of the school property runs along the bluff skirting the valley of the Twelve Mile Creek. Situated on the street and in front of this school is a well, worked by an iron pump. It is a public well. On testing it there was found to be a good supply of water. At this spot, beside the well, the disagreeable odor of pig manure was perceptible though no wind was blowing. Mr. Davis said that in damp weather the odor was much more disagreeable.

Entering a lane, which skirts the eastern side of the school enclosure for a short distance and then turns at right angles towards the west, we walked up to the slaughter house, which by measurement (estimate) is not more than 270 feet from the eastern wall of the school house. The slaughter house, which looks like an old wooden stable, is situated immediately in the rear of (about 30 feet from) Mr. Hillmer's house. Mr. Hillmer lives in this house. The slaughter house contains a killing room, a pen, and a third room which might be used for preparing and dressing meat for market. These rooms all communicate by openings. A rough wooden trough protrudes from the lower part of the frame, and was said by Mr. Davis to be used to catch blood from the killing floor. The walls of the killing room were stained with old blood. Ashes had been scattered on the floor, but the odor from the premises and the surrounding ground was of a very disagreeable character. No well was visible, and on inquiry I was told by Mrs. Hillmer that the necessary water required at the slaughter house was obtained from a well situated inside their cottage. In a pen near by were two calves. I saw no other animals intended for the market.

Accompanied by Mr. Hillmer, Sr., owner of the property complained of, I descended the steep bluff which runs at the rear of the school property and Mr. Hillmer's lot, and walked through a piece of swamp land lying at the base of the bluff along the course of the Twelve Mile Creek. Mr. Hillmer told me that he rented ten acres of this swamp and allowed hogs and cattle to roam over it. He said that offal from the slaughter house was fed to the hogs. The odors arising from this swamp were disagreeable. It occurred to me that a few drains running from the swamp into the creek near by would be of service in removing a lot of offensive vegetable and animal debris from this unsavoury locality. It may also be true that some of the odors complained of may be due to this swamp. Skirting the bluff, Mr. Hillmer and I returned to the street close to Mr. Hillmer's house which is situated on the same side of the street as the school house.

The charge against Mr. Hillmer, *i. e.*, that the slaughter house kept by him is malodorous and is not sufficiently removed from the school house, his dwelling and the street is true. Mr. Hillmer contends that the well in front of the school house is public property and can be used by him and his servants if they wish. He denies using it and showed me another good well belonging to him which was situated a short distance from the school.

Mr. W. H. Young, ex-mayor of Oakville, whom I saw afterwards, informed me that there was a second slaughter house situated in the eastern end of the town against which complaints had been made in 1897 but not so far during the present year. He said this building had originally been used as a stable. I did not inspect it.

I am, very truly yours,

(Signed) J. J. CASSIDY.

REPORT OF NUISANCES BY RAILWAY CATTLE YARDS, PIGGERIES AND SLAUGHTER HOUSES.

By the Secretary.

Toronto, August 12th, 1898.

Mr. Chairman and Members of the Provincial Board of Health :

GENTLEMEN :—By reference to the correspondence herewith submitted by your Secretary, it is apparent that the disposal of animal refuse is a subject, not only responsible for a nuisance and danger to health of a most important character, but one which, hitherto our Local Boards of Health have found themselves incapable in a large degree of dealing with. Some of the reasons for this are :—

1st. That such materials owing to their being incidental to the growth and development of our animal industries, necessarily not only exist, but tend to increase in the growth of such industries.

2nd. That they occur in manure heaps in quantities on farms, and their existence is looked upon as not only necessary, but harmless.

3rd. That being in our towns and cities looked upon as waste products, they are considered rather as a nuisance than an article of commerce.

4th. That owing to badly located cattle-yards and stables as well as defective construction, and the absence of means for systematic and effective cleaning, these materials harmless at first in themselves, are allowed to accumulate, and by decomposition allowed to become productive of most serious nuisances.

5th. The varying character as regards nuisance of the several classes of animal refuse.

By reference to the correspondence it will be seen that the materials are divided into three classes practically.

1st. Those incidental to the stock-yards, and notably hog-pens, which are used for shipping animals along our chief lines of railway. Commonly the station is in or near the village or town, and with habitations close at hand. At first there was but an occasional car shipped, but this has grown to several or many during the week. Yards are enlarged generally close to the freight stations. Often on railway property for public convenience, such are at first not a serious nuisance, since the animals are in a pen and are loaded on the car when they arrive at yard. Now, however, a number of car-loads are often collected in lots, the result being that several hundred animals are kept for from 12 hours to several days in these yards, which have now been specially constructed for them ; and hence it happens that these become littered with manure which is tramped into the ground, which is not covered over against the wet, and has added to it the refuse food which is carelessly fed the hogs in crude troughs. While care to remove regularly as much as possible this animal refuse is often seen at some cattle yards, yet at others very great indifference is shown ; and in almost every case the work of removal cannot be thorough, owing to there being no floor but the ground, no roof to protect against the water, and no water with efficient drainage to flush the floors. So as far as your Secretary is aware, no properly constructed and equipped cattle and hog-yards exist at any market or railway station in Ontario ; and the complaints are wholly dependent upon the amount of business, the location of the yards and the incident of having a soil varying from a heavy clay to the lightest sand. In some cases again, the nuisance of yards is added to by the cleaning of cars at points near dwellings. If flushed, the refuse water lies putrefying along the railway, or if drained into a creek becomes the frequent conveyor of hog cholera to the neighboring farms.

Illustrations of complaints regarding this class of nuisance will be found from Teeswater, Rodney, Walkerville, Tweed, Galt, Creemore and elsewhere.

A second and most serious class of such nuisances arises in connection with the piggeries which exist in the neighborhood of cheese factories and creameries for using the whey and milk supplied by them.

The causes of the nuisance are the same, and the nuisance is much more extended, since the hogs are kept and less care even is usually taken to give them good pens. The first class located in towns and cities, generally affects more persons directly and are more likely to be kept fairly within bounds; but the latter too often create a larger evil, affecting the commercial character of the cheese and butter products. Besides this, the old complaint of sour whey being carried from cheese factories in the very cans used to bring fresh milk to the factory seems to-day to prevail as formerly.

For instance, I visited very recently a new cheese factory, started this year, and found the whey-tank an open wooden cistern sunk in the ground and within three feet of the room where the cheese was made, the pipe leading without a trap directly from the barrel to the room, while at a distance of one hundred feet was an elevated tank with a hose attached by which the factory patron could fill his tins as he started for home.

The illustration affords food for reflection as well as supposedly first-class food for the English market.

The third, and even more common source of nuisance is that from slaughter houses. The most miserable of all structures, usually in the outskirts of a town or village, without a tight-floor or a single convenience for properly collecting blood and offal, either for boiling or removal; no drainage, no water supply for proper flushing; these sources of the meat foods of our people, abound almost everywhere, and the horror is added to by the almost universal feeding of raw and decomposing offal to the hogs, which is to be turned into pork. The persistent and continued existence of this evil we speak of, legislation regarding which has been placed on the Statute books for the use of Local Board of Health, is not more a commentary upon the wholly inadequate basis upon which Local Boards are established and carry on their work, than upon the indifference of the public who patiently endure such a condition of affairs.

I shall refer to but one instance illustrated in the correspondence from Oakville.

May 19th.—A complaint received regarding nuisance caused by slaughter-houses and piggeries near the schools.

May 20th.—Clerk notified and asked to explain by diagram their location and whether licensed, and how refuse was disposed of.

May 25th.—Clerk makes reply. States slaughter-house is on bank of creek; refuse fed to hogs; nothing but natural drainage; no licenses issued. Diagram shows pens some 150 to 300 feet from school house.

May 26th.—Reply sent to Local Board pointing out that Act requires slaughter-houses to be licensed and also in feeding of hogs offal to be boiled and fed fresh under penalty. Reasons given for believing the slaughter-house and piggery a nuisance, and indicating powers and duty of Local Board, also stated that the school authorities had been advised of my views.

June 2nd.—Secretary of Local Board replied, that Board had by resolution instructed Sanitary Inspector to notify all butchers to discontinue feeding offal unless boiled, and then fed in troughs. Inspector could not discover a nuisance.

June 4th.—Your Secretary was glad to know Local Board was acting, and advised a common slaughter-house for public slaughtering. If this is not done, action to abate nuisance and license must be taken.

June 8th.—Clerk replies that Board met on 7th and by resolution called attention of Town Council to By-law No. 5, prohibiting slaughter-houses within the municipality, and ask Council to enforce or repeal, and if repeal make new By-law under Provincial Health Act. Board denies wishing to injure butchers and advises a common slaughter-house.

June 8th.—Your Secretary compliments Local Board on action taken and looks for speedy action.

June 17th.—Clerk reports Council met on 13th but took no action on the communication; next meeting on 27th.

June 18th.—Your Secretary notified Town Clerk that the matter of a nuisance near school had by school authorities been laid before the Minister of Education, who had referred to your Secretary for information.

By law 5 of town prohibits slaughter-house within the town or the feeding of any offal. Date 1887.

June 28th.—Information sent your Secretary by school authorities that nothing whatever had been done to abate the nuisance by the Local Board of Health or Council, and believes that they will do nothing, hoping that all parties will let the matter drop. The butchers water their horses at the school well.

June 30th.—Your Secretary promises he will endeavor to have action taken.

June 22nd.—Department of Education is again appealed to, and asks if this Board cannot take the matter up independently of Local Board.

Such has been to date the total result of some 14 letters which have passed relating to this matter alone.

With such an exhibition of the utter break-down of municipal government we vainly seek for a remedy. Unless a dozen Inspectors of this Board were appointed with plenary powers to prosecute it would be quite impossible to deal with such evils, unless the local health machinery of our 250 incorporated municipalities undertake the responsibilities laid upon them.

One is compelled to conclude that our newspapers could profitably write many editorials, based upon that chapter, entitled "Political Control," in the recent work on street cleaning published by Col. George E. Waring, Commissioner of street cleaning in the City of New York.

With regard to the improvement of cheese-factories when prominent cheese men appealed last winter to your Secretary to aid in the inspection of the 1,100 factories in the Province he suggested appealing to the Local Boards.

The reply was a laugh at the idea, with the remark, that members of such boards in townships are usually directors and patrons of the factory. In our villages the local butcher and drover are commonly potent factors in deciding events on the first Monday in January.

At present, the only hope of improved conditions seems to be the slow process of educating the people, not to an appreciation of the evil so much as to a recognition of their responsibilities, powers and duties as citizens, or the placing of the power in the hands of a trained county officer of health, paid to do the work, and protected in the performance of it

All of which is respectfully submitted.

[Signed] P. H. BRYOE,
Secretary.

REPORT *RE* MEAFORD CEMETERY.*By P. H. Bryce, Secretary.**Toronto, April 20th, 1898.**To the Chairman and Members of the Provincial Board of Health :*

GENTLEMEN,—As will be seen from the correspondence herewith submitted, it is proposed to establish a new cemetery, owned and managed by a company seeking incorporation under the Act relating to Cemetery Companies, on a property within the limits of the Town of Meaford, although, as will be seen from the map herewith submitted, practically outside the town and with its drainage toward a direction away from the settled part of the town and toward the lake. Your Secretary is acquainted with the topography of the town, and has not deemed it necessary, before submitting the application for your approval, to make a special inspection of the ground.

The Local Board of Health and the Town Council of Meaford have, as seen in the correspondence submitted, passed resolutions approving the site, and the consent has also been obtained of all persons living in proximity to the proposed site to the location of a cemetery thereon. As will be seen by the plan the cemetery is to be located on the ridge of hills which dips sharply northward to the shore of Georgian Bay. Apart from its present location, an admirable opportunity is given for the sub-soil drainage of the area.

Your Secretary would therefore recommend that the Board approve of the site of the proposed Meaford cemetery with the understanding that the company complies with the requirements of the several Cemeteries Acts in the matter of drainage and other particulars as are indicated therein. The report was adopted.

REPORT ON TEMPORARY SCHOOL ACCOMMODATION, UNDER PUBLIC SCHOOL BOARD, TORONTO.

*By P. H. Bryce, M.A., M.D.**Toronto, May 6th, 1898.**To the Honorable, the Minister of Education of Ontario :*

SIR—I beg to report that acting under instructions received from you, I have visited, in company with the Chairman of the Toronto Public School Board and officers of the Board, the several buildings referred to in the appendix to this report, occupied as temporary schools under the supervision of the Board, and have set down in a tabulated form therein the results of my inspection. The several points bearing upon the sanitary condition of these buildings are indicated in the Appendix, but may be briefly referred to herein.

They refer to

(a) Floor space and cubic air space per pupil ; (b) Play ground and location of school ; (c) Ventilation and conveniences ; (d) Lighting ; (e) Heating.

(a) With regard to floor space, 18 school rooms out of 29 inspected, have less than 16 square feet per pupil, the amount generally considered necessary. As in addition to this, the seats are usually double, it will be seen that even in cases, as in some of the churches where the cubic air space reaches or exceeds this amount, the contact of children

by such means materially increases the danger of the spread of communicable diseases from one to another. In the matter of the cubic air space per capita, 23 out of 30 school rooms have less than the 250 cubic feet required under the School Regulations.

(b) As regards playgrounds, 12 out of the 29 classes have no playground, unless it be the public streets, and in several instances as where stores are occupied, the schools are on streets along which street cars run. In such instances, as in a number of them, the stores or dwelling houses have the doors and windows directly on the streets, and the noise from passing cars and wagons must be a very serious obstacle to the proper conduct of the school, and indeed is very injurious to both teacher and pupils.

Under such circumstances, the much needed recess to escape the foul air of the school room has its good results greatly lessened, and as the classes in almost every instance are of the smaller children, this condition must on some streets become a source of danger to the pupils and a worry to the teacher.

(c) Except in two buildings (with four classes) there is no mechanism for artificial ventilation. In all other cases there is no ventilation but by windows and by stoves (not always even stoves), occasionally assisted by a stove-pipe hole, or in the sheds on the school premises a register in the chimney shaft. As the stoves were without fires in most cases, there is left at this season only the windows, and these both because of the noise and draught were in many instances tightly closed.

As will be seen by reference to the Appendix the cubic air space exceeded in seven instances the minimum required by law. These were in all cases church rooms, and had they been fitted up with good black-boards and proper lighting, they would be excellent.

In most instances the closet conveniences were not objectionable, although in five their location was such as to make odors from them likely to be noticed in the school rooms or corridors.

(d) The lighting in four only out of 29 is noted as "fair;" in the others it is "defective," or "very defective. The defects are due to five different causes:

1st. Where churches are utilized, the windows are usually narrow and too few, and in many instances have frosted or colored glass, and in a number colored lights at top and sides.

2nd. The proximity of windows to other buildings or to trees.

3rd. Low windows are in the sheds, where the position of the shed makes the proper location of windows impossible.

4th. The area of windows in basements. In some roomy basements, except as to obstructions to light from steam pipes, not more than three feet of window is above the ground level, and in some north rooms the teacher has to make writing with letters three inches long that they may be seen, and then imperfectly by the pupils in the back benches.

5th. The cross lighting in nearly all the basements and sheds, and the blackboards in shadow making it quite impossible in almost every instance for all the pupils of the class to see the whole extent of the blackboards.

(e) The heating in most instances seemed fair; but the season made this impossible of determination. It may be stated however, that the heating with stoves in one corner of the room presents the invariable objection of improper distribution of heat. In very many cases, as in the sheds, the wide window, hinged at the bottom, cannot be opened in winter without the cold air pouring down on children near by, while in one instance the furnace pipe was within one foot of a seat, and in the sheds and in some basements a stove-pipe passed within a few feet of the children's heads. The furnaces in the stores and dwelling houses may warm, but as there were no fresh air boxes in some instances, the reheating of room and cellar air is inevitable.

Conclusions. By reference to the Appendix, it will be seen with regret that not a single room does in all the several points fulfil fairly reasonable requirements. If ample in air space, it is defective in lighting; if in lighting fair, then in air space and ventilation.

In some instances it was plain that some intelligent care on the part of the teacher in adjusting window curtains would have increased the light or lessened the evils of cross-lights; while in others the judicious opening of a window would have, in the weather at the time of inspection, lessened the evils of foul air. But such a remedy for bad ventilation would be impossible in cold weather. In one instance where the air was very foul, not a window was raised, while a door into the attic space was tightly closed. In the greater number of instances, however, the teachers seemed to keenly appreciate the needs of the situation, and were doing their utmost to minimize evils. If, however, pale and wearied looking faces are to be taken as evidences, then it can only be said that such unsanitary conditions are producing results on both teachers and children, demanding a prompt and effective remedy.

But further it may be said that if the influences of vitiated air and defective lighting show themselves most prominently in affecting the health of the teacher, whose nervous energies are taxed to perform her work under such circumstances, they likewise affect that of the children under her charge. It will be noted that in only two or three schools is the lighting fair, and in most the air is bad or very bad. The immediate effects of foul air are to injure the nutrition of the child. The appetite and digestion are disordered, and every tissue, and primarily the nervous system, is affected. Since of all organs, the eye during waking hours is alone constantly in action, and nature has given it and its appendages nerve supply from the whole or parts of six out of the 12 pairs of cranial nerves, it will be apparent that defective nutrition will most readily be productive to it of serious disorders. Indeed actual disease of the retina has been found to have a direct relation to the poverty of the blood. Actual medical experience has shown that in 100 consecutive cases of chronic headache, 83.6 per cent. have been relieved by correcting the eye strain by proper glasses. What influence school work has in producing such abnormal vision has been illustrated by Widmark of Stockholm. Of 742 female pupils in the first forms, he found no myopia (short sight); while the percentage of short-sight in girls at 16 was 33 per cent. We may from such illustrations judge of what effects are being produced in these schools; first from the defective lighting, and second by the effects of foul air upon children for whom the teaching ought to be largely by blackboard. Teacher after teacher tells the story of how pupils, who at first could see the blackboard from the back seats, have as time has gone on had to be given seats nearer and nearer the front. The eye-strain soon produces mental weariness, and favorable results of the teacher's efforts cannot be looked for. The general disturbance of the nervous system, notably in girls, by eye-strain must inevitably produce effects life-long in their unfortunate results, and the continuance of the existing state of affairs cannot be condemned too strongly, affecting as it may the welfare of so large a number of children.

The extent of the need for a remedy for these existing evils will be understood when I state that 1,510 children were in actual attendance at the time of inspection, or one-twentieth of the total 30,000 public school population is unprovided with permanent school accommodation. When it is further remembered that the natural increase of births over deaths in Toronto, means an annual increase of population of over 1,000 (it being 1,278 in 1876), it is plain that there must be an annual expenditure for new buildings, otherwise conditions, now very bad, will become intolerable.

In the Annual Report of the Public School Board for 1897, I find it stated that during the past three years there have been no new school buildings erected in Toronto. There would not appear to be any difficulty in closing a number of these schools by taking action under the provisions of the Public Health Act, but I am assured by the Inspector

Buildings that he has used every endeavor to get public halls and churches, instead of

stores and private houses in several districts, but failed. There seems no alternative therefore, but during the warm weather to allow these schools to be continued where they are at present, in order to prevent a loss of school privileges to a very large number of children.

While suggesting this as a temporary expedient, I would recommend that your Department should put in operation whatever powers exist under the Public School Act, to bring about such a remedy for the state of affairs herein indicated, as will be permanent in its character.

I have the honor to be,

Your obedient servant,

PETER H. BRYCE,

Secretary of Provincial Board of Health.

APPENDIX TO REPORT RE TORONTO PUBLIC SCHOOLS.

School.	Location.	Attendance		Cubic air space. Playgrounds.	Ventilation.	Conveniences.	Lighting.	Heating.
		Re- s.	Ave.					
Bathurst street..... Kindergarten.	Shed	76	60	Playground of school, 130 sq. feet floor space, 145 cubic ft. air space.	Windows on n.e. hinged at bottom, not avail- able in winter, air close.	Closets out doors, lat- rines.	Low windows on north and east, light very defective.	Stove.
Clinton street..... Kindergarten.	Church S. S.	72	63	Street principally. 12 ft. floor space, 134 ft. air space.	Windows (closed) one vent in ceiling (closed), air very foul.	Closets off passage, not ventilated, smelling.	Four windows south and west, light fair.	Furnace.
Sheridan street..... Kindergarten.	Church proper.....	38	38	34 ft. floor space, 443 ft. air space.	Double windows only (closed), air is warmed in furnace, large cubic air space.	Earth closets	Windows are narrow, east and west, light poor.	Furnace, reheat- ing air of room.
St. Claren's ave..... Kindergarten.	Church S. S.	65	41	Street. 15 feet floor space, 153 feet air space.	Windows only (closed), door open at time of visit.	Water closet in cellar.	Windows west and north, small.	Furnace in base ment.
Shirley street	Old building, two- room, s. w. and s. e.	54 54	46 47	Grounds of school build- ing, 12 ft. floor space, 176 ft. air space, 12 ft. floor space, 176 ft. air space.	Windows only, door open at noon, hour, rooms very old and small, air foul.	Closets of main build- ing, air in one room main building foul, in- let of furnace duct closed.	Lighting fair, window s.w. and s.e.	.....
Grace street..... Junior 1st class f.r.m.	Basement of school building, s. w. room.	56	54	Low ceiling (8 ft) sleep- ers of floor resting on earth, playground of school and also in base- ment, 14 ft. floor space, 111 ft. air space.	Windows only (none open), cloaks hanging in room, air poor.	Closets (Smead-Lowd) splendid order.	Windows south an west, 4 feet in height, light fair, but on du- day children cannot see board.	Stoves.
Dewson street	Shed	47	45	School grounds no play sheds, 15 sq. ft. floor space, 164 cubic ft. air space.	Windows, registers near floor in chimney shaft, air foul.	Closet of school.....	Four shallow window, light poor, cannot see blackboard from a dis- tance.	Stove.
(a) First class.								
(b) Second grade	Shed	44	42	16 square feet floor space, 176 cubic ft. air space. Same as above.	Same as above, air foul.	Same as above.....	Same as above.....	Stoves.

Gladstone ave. (a) Junior 2nd form.	54	Shed	54	11 square ft. floor space, 110 cubic ft. air space. School grounds.	Windows hinged at bottom, low and with outside screens, regis- ter near floor in chim- ney shaft, small area, air foul. Same as in (a).	Closets of main build- ing.	Windows one south, three west, low and wide, only 10 feet from a house, lighting de- fective.	Stove.
(b) Senior 1st form	53	Shed	50	11 square ft. floor space, 116 cubic ft. air space. Same as in (a).	Same as in (a).	Same as in (a)	Windows west, light fair, only 25 feet from a privy.	Stoves.
(c) Junior 1st form	47	House	43	7 square ft. floor space, 72 cubic ft. air space. No play ground.	Windows only, down, air very foul and stifling.	House closet up stairs.	Double room, long and narrow bay window to east. In parts very defective.	Furnace.
(d) 2nd form	48	Store	46	10 square ft. floor space, 107 cubic ft. air space. No play ground.	Windows only (closed) air foul, cloak room separate.	Closet of store.	Lighting to east, defec- tive.	Furnace.
(c) Senior 2nd form	47	Store	44	10 square ft. floor space, 122 cubic ft. air space. No play ground.	Same as (d).	Same as (d)	Same as (a)	Furnace.
Dundas street, No. 47. (a) Junior 2nd form.	46	Store	39	12 square ft. floor space, 145 cubic ft. air space. No play ground.	Windows and transoms over door.	Closet in basement di- rect under stairway.	Window to west, with upper part colored, light very defective.	Furnace.
Dundas street, No. 41. (b) Junior 1st.	48	Store	38	12 square ft. floor space, 149 cubic ft. air space. Same as (a).	Same as (a).	Same as (a)	Same as (a)	Furnace.
Ryerson school. (a) First class.	66	North-west base- ment.	56	16 square ft. floor space, 146 cubic ft. air space. School ground.	Windows only, ceiling 7 ft., floor on joists on ground, air bad.	Closets of Smead-Dowd on system.	Windows north and west, 3 feet above ground, writing on board to be 3 in. long to be seen at any dis- tance, greater part of the room in shade.	Steam pipes and with stove.
(b) Senior 1st class	*28	North-east base- ment.	*26	39 square ft. floor space, 341 cubic ft. air space. Playground same as (a).	Ventilation same as (a), air fair.	Same as (a).	Lighting north and east, same conditions as (a), very defective.	Same as (a).

* Teachers report large scholars staying away on account of condition of rooms.

APPENDIX TO REPORT.—*Concluded.*

School.	Location.	Attendance		Cubic air space, Playgrounds.	Ventilation.	Conveniences.	Lighting.	Heating.
		Reg.	Ave.					
Ryerson school.— <i>Con.</i> (c) Kindergarten	South-east basement.	*80	*62	13 sq. ft. floor space, 107 cubic ft. air space. Playground of school.	Same as (a) and (b), air poor.	Same as in (a)	Same as in (a), except much better light, windows being south east, fair.	Same as (a).
Claremont street mission	Church S. S.	41	36	27 square ft. floor space, 487 cubic ft. air space. No playground.	Windows, air fair, space large.	Closet	Narrow windows, with stained borders, two to south, two to north near a house; windows average 10 square ft.; some light from skylight, very defective.	Furnace.
Dufferin school	North-west basement of school.	*58	*54	16 square ft. floor space, 137 cubic ft. air space. Playground of school.	Windows and ventilators; air only fair.	Closet	Three windows to west, only 3 ft. from ground; 4 steam pipes cross upper part of windows; light poor.	Steam pipes and stove.
(a) Berkeley street.								
(b) Kindergarten	South-east and south-west rooms of basement.	83	75	22 square ft. floor space, 190 cubic ft. air space. School ground.	Windows also, with steam coil in ventilator shaft; air very good.	Closet	Same as in (a), south and east windows; light fair.	Steam heating.
Oak street church	Upstairs Sunday school room, 2nd class separated by curtain in same room.	60	53	19 square ft. floor space, 318 cubic ft. air space.	Windows and high ceiling in gable; air very good.	Smead-Dowd system.	Five windows north and east, two west; light defective; children in each room face towards light.	Smead-Dowd furnace.
Junior 1st form.								
Senior 1st form	2nd class separated by curtain in same room.	45	40	26 square ft. floor space, 421 cubic ft. air space. No playground.	Windows and high ceiling in gable.	Ditto	Ditto	Smead-Dowd furnace.
Prospect Park Rink	Club room	68	48	17 square ft. floor space, 226 cubic ft. air space. No playground.	Windows, no ventilation; air foul.	Closets close to hall ..	Three windows west, two windows north; good light.	Furnace.
Kindergarten.								

Bolton avenue..... Junior 1st.	Church S. S.	61	49	30 square ft. floor space, 485 cubic ft. air space. No playground.	Windows; ventilators over gas jets.	Closet	Three windows to south, as well as skylight and fanlight. Fair.	Furnace.
Pape avenue, No. 484... Junior and Senior 1st.	Private house, two rooms thrown into one.	33	30	13 square ft. floor space, 132 cubic ft. air space. No playground, except neighboring field.	Windows; one fanlight hinged; air very foul.	Water closet.....	Small windows, light shut off by house distant three feet; one square window with colored glass above, most of room in shadow; light most defective.	Furnace.
Carlaw avenue..... 1st form.	Church S. S., two adjoining rooms.	46	41	19 square ft. floor space, 248 cubic ft. air space. No playground.	Windows and gable; ventilation poor, aided at present by doors open to next room.	Water closet...	Six windows, south light cut off by trees and house; two square windows to west; trees near.	Furnace.
Kenilworth avenue..... (a) 2nd, 3rd and 4th forms.	Church, north room	52	52	15 square ft. floor space, 228 cubic ft. air space. Playground on common.	One small round window on hinge in gable end; air foul.	Closet.....	Four windows east, four windows west, stained yellow glass, stained borders, six inch squares; lighting very defective.	Furnace.
(b) Junior and senior form	Church, s. room ..	42	31	10 square ft. floor space, 106 cubic ft. air space. Playground on common.	Windows open vertically, not open on account of draught; one stovepipe vent; air very foul.	.....	Windows south, east and west, lower half of windows stained glass; light good if regulated.	Furnace; stovepipe within one foot of seats.

* (Average 70). Two sets of children, one in forenoon, one in afternoon (170 daily).

† Only 48 seats, balance on wall benches.

REPORT *RE* INSPECTION OF SCHOOL IN TRAFALGAR TOWNSHIP*By P. H. Bryce, M.A., M.D.**To the Chairman and Members of the Provincial Board of Health :*

GENTLEMEN,—At the request of the Local Board of Health, I visited the school at the Union Section on the 9th concession of the Township of Trafalgar on May 27th, and addressed the following report to Dr. N. McCrimmon, M. H. O. of the township: I beg to state that careful investigation, with yourself, failed to find any unsanitary conditions on the premises likely to provoke an outbreak of diphtheria, such as the outbreak which occurred in April, the particulars of which were so fully obtained by yourself, with me, from the trustees, Messrs. Cook and Fullerton, and the young school mistress.

The closets are earth closets, and show evidence of close supervision, while the location of the well is such as to have made it impossible for any pollution other than what might have accidentally reached it from the surface. I would suggest that if a new well is dug it be tightly covered, with an air pipe leading in, and that the pump be placed at a distance from the well and connected by an iron pipe, covered to keep out the frost.

More ventilation of the foundation of the school than was found, is necessary to keep the joists dry.

By a careful enquiry as to the dates of the appearance of cases of diphtheria amongst scholars and neighboring families, as well as by examination of absentees as seen by the roll, there seemed fairly clear evidence of the outbreak being connected with a case or cases of sore throat of a mild character which had not been detected. Thereafter, the evidenced was closely connected with the return of children to school after Easter, who were again exposed to some case or cases who were convalescent but not free from infection in the nose and throat.

The recommendations are to have:

1st. The floors scrubbed with a strong alkali soap.

2nd. The wainscoting washed down with disinfectants under the supervision of the Medical Health Officer.

3rd. The disinfection of the seats and desks in the same manner.

4th. The disinfection of school books by steam, will in my judgement, prove adequate to the removal of any infection which might possibly, though not probably, have remained in the school. And I do not anticipate any re-appearance of cases, unless brought to the school in the clothing of some person, which has not been properly disinfected.

THE VALUE OF SANITATION AS AFFECTING THE BIRTH RATE AND OF POPULATION INCREASE.

BASED ON A STATISTICAL STUDY OF VITAL STATISTICS OF TORONTO, MONTREAL,
CHICAGO AND PHILADELPHIA.

*By J. J. Cassidy, M.D., Toronto.**To the Chairman and Members of the Provincial Board of Health :*

GENTLEMEN,—It is interesting to make comparison between the vital statistics for 1897 of Toronto and Montreal, in Canada, and Philadelphia and Chicago, in the United States, in order to estimate the facts which underlie the natural increase of population in these cities. In Montreal, with a population of 262,100, the total births for 1897 were 8,850, or 32.43 per 1,000 of population. In Toronto, with a population of 183,172, the births were 4,076, 22.25 per 1,000. In Philadelphia, with a population of 1,214,256, the births were 29,591, or 24.37 per 1,000. In Chicago, with a population of 1,619,225, the births were 28,158, or 17.39 per 1,000.

In reference to the high birth rate of Montreal, Dr. Roy, Recorder of Statistics, writes that "he only gives the number of those who have been registered, and that owing to a defect in the law, registration among those who do not have their children baptized is not regularly done." In reference to the birth rate of Chicago, Dr. Reynolds, Commissioner of Health, of that city, writes that he does not get all the births that occur, probably not over 90 per cent., possibly not over 80 per cent. Occupying middle ground, Philadelphia maintains a fairly high birth rate, 24.37 per 1,000. The surprising part of the record is the relative showing of Toronto, with a birth of 22.25 per 1,000, higher than that of Chicago, but lower than that of Philadelphia.

The marriage rate of Montreal, 6.9 per 1,000, not only does not explain the high birth rate of that city, but makes it the more surprising. It seemed possible that a considerable percentage of illegitimate births might account for the high birth rate and low marriage rate. This, however, is not the reason. Through Dr. Roy, Recorder of Statistics, we learn that the illegitimate births in Montreal were 644, which sum being deducted from the grand total of births, 8,850, leaves 8,206, or a legitimate birth rate of 31.3 per 1,000.

In Toronto, the marriage rate, 8.19 per 1,000, is higher than in the other Canadian city. In Chicago, the marriage rate is 8.43 per 1,000.

In Philadelphia, the marriage rate, 12.67 per 1,000, is highest of any of these four cities being nearly double that of Montreal.

In Chicago and Philadelphia, premature and still births are excluded from the death rates. In order to compare, on even terms, with these cities, we shall eliminate the premature and still births from the death returns of Montreal and Toronto. The deaths in these cities are as follows: Montreal, 6,939, a ratio of 26.47 per 1,000; Philadelphia, 22,375, a ratio of 18.72 per 1,000; Toronto, 2,873, a ratio of 15.68 per 1,000; Chicago, 21,809, a ratio of 13.46 per 1,000.

The increase of births over deaths depends on two chief factors; either an increase of the birthrate or a decrease of the death rate. The following table makes a comparison between births and deaths in these cities during 1897, with the natural increase:

City.	Population.	Increase of Births over Deaths.	Percentage of Increase.
Montreal.....	262,100	1,911	.0072
Toronto.....	183,172	1,203	.0065
Philadelphia.....	1,214,256	7,216	.0059
Chicago.....	1,619,226	6,349	.0039

The highest of these percentages, that of Montreal, is a trifle under three quarters of one per cent. Now, according to the estimated rate given in the annual report of the Registrar-General for England and Wales, the natural increase for that country for 1890 is $1\frac{1}{2}$ per cent., and the report for 1891 states, that the same rate was maintained for that year. The natural increase in these cities is, therefore, small. Yet the effect of an immense birth rate is apparent when we see that Montreal, in spite of a large mortality, is able to show a greater increase than Toronto. Similarly Philadelphia, in spite of a relatively large death rate, shows a larger increase than Chicago.

During the year 1897, notable epidemics of preventable diseases did not prevail in these cities. Philadelphia had a mortality of 401 from typhoid fever; in Chicago, typhoid fever caused a mortality of 437, against 751 in 1896, an immense decrease. In contagious diseases, scarlatina caused a mortality of 66 in Toronto, and small-pox a mortality of 12 in Montreal. Moreover, the annual death rate of Philadelphia, 18.72 was, for a large city, quite normal; that of Toronto, 15.68, was also satisfactory.

Under these circumstances, the low death rate of Chicago and the high death rate of Montreal demand some explanation. An authority (Rohé) states, that in a large city, such as Chicago, a death rate of 13.46 "would indicate that all the deaths had not been recorded, or that the population had been over-estimated; rates above would be evidence, that there were special causes at work demanding sanitary investigation and improvement." Without undertaking to dispute these assertions, it may be well to point out that the Chicago Department of Health, which in 1897 was carried on at an expense of \$213,560, maintains a special bureau of vital statistics, and certainly ought to be informed of every death which occurs in that city. The statistical population figure used is the official school census declared July 1st, 1896. In Chicago, moreover, the proportion of adults to children is, probably, greater than the normal, and the death rate is naturally lower. Besides, great efforts are being made in that city to put down disease and promote good health, so that owing to the social condition of many of the people, and civic sanitary improvements as well, a low mortality is quite conceivable.

A survey of the diseases, which produce the large mortality of Montreal does not reveal many causes demanding special sanitary investigation. In 1897, there was an outbreak of small-pox, which caused twelve deaths, and the death rate from other zymotic diseases, is not high. The following table shows the typhoid fever mortality of the four ties, with the ratio per 100,000 of population:

	Deaths from typhoid fever.	Ratio per 100,000.
1897. Toronto.....	20	16.37
Chicago.....	437	26.98
Montreal.....	80	30.52
Philadelphia.....	401	33.02

Here, we may admit that the Montreal ratio assimilates too closely to that of Philadelphia to be reassuring. It may be, therefore, that the Montreal water works demand sanitary investigation and improvement, or the large typhoid mortality may be explained in a different way. In order to show the mortality from zymotic diseases, whose incidence falls most on children, in a city with a high mortality, compared with a city having a low mortality, the following table is submitted:

1897. Montreal—Deaths from variola.....	12
“ “ mumps.....	00
“ “ measles.....	63
“ “ scarlatina.....	17
“ “ whooping-cough.....	95
“ “ diphtheria and croup.....	251
	438

Or 6.3 per cent. of the total mortality.

1897. Chicago—Deaths from variola.....	00
“ “ mumps.....	4
“ “ measles.....	139
“ “ scarlatina.....	81
“ “ whooping-cough.....	160
“ “ diphtheria and croup.....	772
	1,156

Or 5.3 per cent. of the total mortality.

Here, an advantage of 1 per cent., on the side of Chicago, shows, that measures for the suppression of contagious diseases were more successfully carried out in Chicago, than in Montreal. It is only fair to say, however, that in Montreal, on account of a high birth rate, there are more candidates for contagious diseases, and, consequently, greater difficulty is experienced in checking outbreaks of these diseases than in Chicago. Some other factor than insanitary conditions seems, therefore, necessary to explain the high

death rate of Montreal. It seems to be due to a large mortality among infants and young children, particularly the former. For instance, the deaths of children under five years of age in Philadelphia were 7,605, or 33 per cent. of the total mortality. In Toronto, the deaths of children under five years of age were 998, or 34.73 per cent. of the total mortality. In Chicago, the deaths of children under five years of age were 8,546, or 39 per cent. of the total mortality. In Montreal, the deaths of children under five years of age were 3,273, or 47.16 per cent. of the annral mortality. In Montreal the loss of infantile life appears to be excessive. The actual figures are :

1897. Montreal—Total mortality.....	6,939
Deaths under one year.....	2,306—33.23%
Deaths from one to five years.....	967—13.93%
	3,273 or 47.16%
1897. Chicago—Total mortality.....	21,809
Deaths under one year.....	5,735—26.29%
Deaths from one to five years.....	2,811—12.88%
	8,546 or 39.17%

The mortality rate for children from one to five years of age is better, by over 1 per cent., in Chicago than in Montreal ; but the great divergence appears when we compare the respective mortality rates of children, under one year of age. Under this head, Montreal has a mortality of 6.94 per cent. larger than that of Ohicago. This does not mean that infantile life is more carefully preserved in Chicago, than in Montreal. The death rate among infants bears a relation to the birth rate ; in cities where the birth rate is high, the infantile death rate is high, and where it is low, the infantile death rate is low.

Among the causes that make the mortality among infants and children high are : Parents too young or sickly, hereditary taints, unhealthy environments, improper and insufficient food and clothing. It is, simply the manifestation of the workings of the law of the "survival of the fittest." As evidence of the soundness of this view, we may say, that in Montreal, 658 deaths were due to congenital debility, 129 to infantile convulsions, 310, a large number of which were in children, to simple meningitis, and 1,396, the greatest number of which were probably in infants and children, to diarrrhœa and gastro-enteritis, which was the higest single factor in the death rate of Montreal. If to these we add the number of infants and young children, who perished from zymotic diseases, we can see how the large mortality is produced. When contagious disease appears in Montreal, it is all the more necessary for the health authorities to exert themselves and enforce good hygiene in the domicile and the school, so that though the congenitally weak may perish, the largest number of those, who are fit and strong, may be spared to reach adult age.

REPORT OF THE COMMITTEE ON VENTILATION.

By J. J. CASSIDY, M.D.

TORONTO, January 31st, 1899.

To the Chairman and Members of the Provincial Board of Health :

GENTLEMEN,—On Monday, January 16th, your committee tested the heating and ventilation of the Public and High Schools of Caledonia, which are included under one roof. The plan and specifications of this system of ventilation are herewith submitted : or, this system may be thus described ; a cowl in a turret at the roof, revolves with the wind, and catching air from whatever quarter the wind blows, delivers it through inlets into the rooms to be ventilated. The incoming air may be heated in winter by a stove, hot water coils or a furnace. After distribution the air is removed through heated outlets at the floor level, which cause it to ascend and escape in the turret, in a direction contrary to the wind. Suggestions are offered in Mr. Shantz's report, about purifying the incoming air by filtration and for cooling the air in summer. The combined outlet pipes may be heated by the smoke stack of the furnace. At Caledonia, as stoves are used, the stovepipes enter flues in the walls in the ordinary way, but they serve to heat the initial portion of the outlet in each room and help to create a current of air. The fresh air descends into each room, enters an area surrounding the sides and the bottom of a box-stove and escapes into the room. The tests applied are herewith submitted :

REPORT OF VENTILATION OF PUBLIC SCHOOL AT CALEDONIA.

Date, January 16th, 1899.

660 feet above sea level.

Weather, fair and mild ; wind, south by west.

Temperature, 42° F. ; humidity, 73% ; barometer, 29.10 inches.

Room No 1 ; floor, 1st ; side, north-east.

Seating capacity, 50.

Persons present, 25.

Net air space, 9750 cubic feet.

Air space per cap., 390 cubic feet.

Temp. at teacher's desk, 64° F.

Humidity, $\left\{ \begin{array}{ll} \text{D.B.} & \text{W.B.} \\ 73^{\circ} & 63^{\circ} \text{ F.} \end{array} \right\} 54\%$

Different temperature in different parts of room at breathing line, 71-64°=7° diff.

Temperature of air at inlet, 98° F.

Fresh air per minute, 146 cubic feet.

Air removed at outlet per minute, 306 cubic feet.

Amount of air supplied per cap. per minute, 5.84 cubic feet.

Air of room changed 1.9 times per hour.

Carbonic acid in 1,000 parts of air, 1.025 (3rd filling); pure air out doors, 12 fillings.

Time of test, 10.35 a.m.

REPORT OF VENTILATION OF HIGH SCHOOL.

Date, January 16th, 1899.

Weather, fair and mild ; wind south by west.

Temperature, 43° F. ; Humidity, 75% ; Barometer, 29.05 inches.

Room No 1, ground floor, west side.

Seating capacity, 62.

Persons present, 37.

Net air space, 9,000 cubic feet.

Air space per cap., 240.32 cubic feet.

Temperature at teacher's desk, 61° F.

Humidity, D. 61° F., W. 53° F.=60%.

Difference in temperature in different parts of room at breathing line, 61 65° F.=4° F.
average difference.

Temperature of air at inlet, 75°.

Fresh air per minute, 118.3 cubic feet.

Air removed at outlet per minute, 232.050 cubic feet.

Amount of air supplied per cap. per minute, 3.20 cubic feet.

Air of room changed=1.54 times per hour.

Carbonic acid in 1,000 parts of air, 1.230 (air close).

Time of test, 2.45 p.m.

In Public School room 1, first floor, the cubic air space per capita, 390 feet, was rather large, but this was due to a small attendance, twenty-five instead of fifty pupils. The temperature ranging from 71° to 64°, showing a difference of 7°, indicated a rather uneven distribution of warmed air. The humidity, fifty-four per cent., was good, especially when compared with the humidity of air supplied by a hot air furnace, which commonly supplies air having a humidity of forty-two to forty-five per cent.

The quantity of fresh air supplied per minute, 146 cubic feet, or 5.84 cubic feet per capita was very small, the standard being thirty cubic feet per capita per minute.

The air of the room was changed in 1.9 times per hour for twenty-five pupils, it should have been changed 4.61 times. The air was rather close, containing carbon dioxide 1.025 per 1,000 vols. In High School, room 1, ground floor, the net air space, 240.32 cubic feet, was less, the number of persons present being greater and the room a trifle smaller. The small difference, 4°, between the highest and lowest recorded temperatures showed an even diffusion of warm air. The humidity, sixty per cent., was favorable. As in the other room, the amount of fresh air admitted was small, the amount supplied per capita per minute, viz., 3.20 cubic feet, being about ten times less than the full amount. The air of the room was changed in 1.54 times per hour, when it should have been changed in 7.4 times per hour. The air was close, the carbon dioxide being 1.230 in 1,000 volumes of air. It was necessary to open the windows to let in fresh air.

The system provides an equable flow of warmed air through a room. In order to produce standard effects as a system of ventilation, it would be necessary to make the inlets large enough to admit the required amount of fresh air and the outlets wide enough to remove a corresponding amount of foul air, and to produce the necessary rapidity of movement fans would be required.

Mr. Shantz informed me that his system would work better on a windy day. He also proposed making certain changes in his system in order to make it more effective.

Mr. Tracy's heating drum and ventilator is an apparatus which may be described as follows: A sheet-iron drum 28½x13 inches, placed above an ordinary base-burner stove, so that the smoke pipe of the stove passes through the centre of the drum; an outlet pipe 2½ inches in diameter, starting from a point two inches above the floor, ascends and perforating the lower surface of the drum discharges air drawn from the floor level directly into the common smoke pipe. A fresh air inlet, 3½ inches in diameter, starting outside the house wall, discharges warmed air into the room. This system was tested by Dr. Bryce as to the temperatures obtained in different parts of the room and also the inflow and outflow of air.

December, 13, 1898, 3 p.m.—Outdoor temp., zero; room, ground floor, south-east corner Yonge and Shuter streets. Capacity, 56,700 cubic feet. This space was heated by a base-burner coal stove, to which a Tracy drum was attached. The following temperatures were taken:

Temperature: 6 feet from stove, 5 feet above floor, 48° F.

Temperature: 25 feet from stove, at ceiling, 48° F.

Temperature: 80 feet from stove, 7 feet above floor, 46° F.

Temperature : 22 feet from stove, on floor under north window, 40° F.
Temperature : 40 feet from stove, on floor under north window, 40° ; on floor near
foul air outlet, 48° F.
Temperature : 40 feet from stove, to north-east 2 feet from floor at window, 40° F.
Temperature ; 60 feet east of stove, 2 feet from floor, 40° F.
Temperature : 6 feet east of stove, 2 feet from floor, 45° F.
Temperature : 40 feet to east of stove, 5 feet from floor, 43° F.
Temperature : 45 feet to east of stove, 5 feet from floor at a window, 43° F.
Temperature : 5 feet from stove, 5 feet from floor, 47° F.
Temperature of fresh air at inlet, over, 150° F.

December 14th, the extraction of foul air was measured and was found to be 17.18 cubic feet per minute or 1,030.83 cubic feet per hour.

The air space would be changed in fifty-five hours.

The fresh air inlet delivered 15.46 cubic feet per minute or 927.75 cubic feet per hour.

We thus see that the small quantity of fresh, warm air introduced by this system into the room, viz., 927 cubic feet, is almost equal in amount to the quantity removed at the outlet, viz., 1030 cubic feet. The slow, equable inflow and outflow secures an even diffusion of the air heated by the stove in all parts of the room as shown by the recorded temperatures given above.

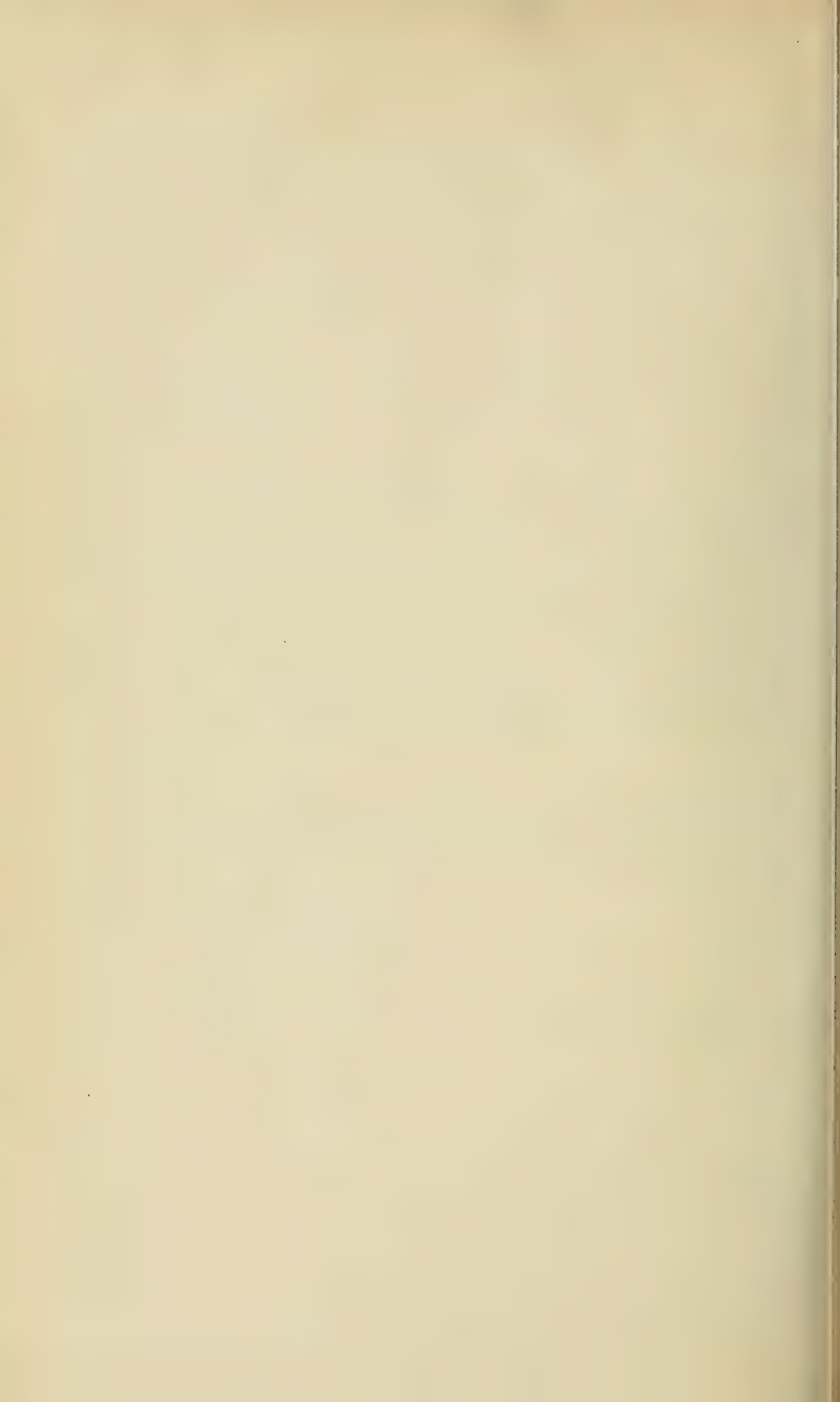
This system deserves favorable notice as a simple and efficient method of causing the air, heated by a common stove, to circulate freely throughout all parts of a room, the lower levels of a room being maintained at about the same temperature as the space near the ceiling. It is suited for the moderate heating of a relatively large air space, in which it is desirable to obtain the required heating of the air with one stove. It is not a system of ventilation, because the quantity of fresh air introduced is very small, but ventilation or the inflow and outflow of air are dexterously employed to provide for the equable diffusion of warmed air.

Your committee has also received a paper and a sketch from Mr. J. Dearness, County School Inspector, London, Ont., describing a system of heating and ventilation used in several schools in that portion of the Province. This system in brief provides for the introduction of pure air into a drum fitted on the end of a large box-stove, where, being heated, it is distributed in the school room. The foul air is removed at the floor level by flues, ascending from the floor, a current being created in them by the heated smoke-stack of the stove, which runs through the common terminal foul air outlet and afterwards penetrates through the roof.

This system is said to have produced good results in heating the buildings in which it is used and with a saving in the matter of fuel.

Not having tested the ventilation in any of the schools, heated by this system, your committee cannot express an opinion as to its merits as a system of ventilating a school room.

PART III.



BELLEVILLE.

REPORT OF THE MEDICAL HEALTH OFFICER.

Nov. 1st, 1898.

To the Chairman and Members of the Local Board of Health :

GENTLEMEN,—I have the honor to present the following report for the year ending 30th November, 1898 :

The mortality for the past year was 137. Of these three died from typhoid fever which was contracted out of the city, fifteen cases of phthisis from city and county, twenty-one cases of pneumonia, four cases of cancer, three still-births, four cases of appendicitis ; there has not been a death from either scarlet fever, measles, whooping cough or diphtheria during the year.

The Inspector made his usual house to house inspection of the city and found the citizens willing and anxious to respond to the requirements in the way of cleaning up yards and privies. We are gradually closing up privy pits and adopting dry earth closets, and in time hope to see all pits abolished. The wells also were inspected and analysis of samples of water sent to Toronto, and any well found to be dangerous was ordered to be filled up. The city council is gradually extending the system of sewers, and I trust that in a few years Belleville will have a complete system of sewerage which will no doubt improve the city in a sanitary way. The Inspector has looked carefully after any complaints forwarded him by me, something over sixty during the year, and placarded any house with infectious diseases. The market square and street near it have been kept clean and free from any garbage, after each market being thoroughly swept and all refuse carted away. We have one slaughter house in the city which has been kept clean and no refuse matter allowed to remain on the premises twenty-four hours. We have had a few sporadic cases of scarlet fever, in each case the house was placarded and disinfection in the way of sulphur fumigation, so that in no case was the fever allowed to extend.

I have the honor to be,

Your obedient servant,

R. TRACY, M.D.,

Medical Health Officer.

BELLEVILLE, November 1st, 1898.

BRANTFORD.

REPORT OF THE MEDICAL HEALTH OFFICER.

Nov. 11, 1898.

To the Chairman and Members of Brantford Board of Health :

GENTLEMEN,—I herein beg to submit to you the annual report of the sanitary condition of the city for the year ending October 31, 1898.

Mortuary statistics.—The total number of deaths for the period comprised in this report has been 204, which in a population of 18,000, gives a death rate of 11.33 in 1,000, and as compared with previous years is a very satisfactory showing. The death rate per thousand in 1893 was 13.83 ; in 1894, 13.03 ; in 1895, 15.56 ; in 1896, 13.88 ; in 1897, 15.01. As to causes of death there was from typhoid fever, 7 ; diphtheria and croup, 3 ; pneumonia, 17 ; phthisis, 16 ; diarrhoea and cholera inf., 11 ; other causes, 150.

Of these there were under one year 41 ; under five years 52 ; over sixty years, 58 ; and over eighty years, eight.

Contagious diseases.—Of this or the so-called preventable class of diseases, there has occurred in the city during the past twelve months a total of 130 cases, or a decrease of 19 from the preceding year. The following table will give the monthly rate and mortality of each disease :

Month.	Typhoid fever.		Scarlet fever.		Diph. and croup.		Measles.		Unclassified.	
	cases	deaths.	cases	deaths.	cases	deaths.	cases	deaths.	cases	deaths.
November.....	3	2	2	0	4	0	0	0	0	0
December.....	2	0	3	0	6	1	0	0	0	0
January.....	3	1	1	0	5	1	2	0	0	0
February.....	0	0	1	0	3	0	0	0	6	0
March.....	0	0	1	0	1	0	0	0	0	0
April.....	1	1	0	0	1	0	0	0	0	0
May.....	0	1	0	0	0	0	0	0	0	0
June.....	0	0	11	0	4	0	0	0	0	0
July.....	3	0	9	0	1	1	0	0	0	0
August.....	5	1	4	0	1	0	0	0	0	0
September.....	9	0	2	0	2	0	0	0	1	1
October.....	18	2	9	0	4	0	0	0	0	0
	44	7	44	0	32	3	2	0	7	1

Total cases, 130, and deaths, 12.

Typhoid fever.—During the past sanitary year there developed in the city 44 cases of typhoid fever, with the rather high mortality of 7, as compared with 31 cases and 4 deaths in 1897, and 55 cases with 5 deaths in 1896. Most of the cases have been confined to the eastern and northern portion of ward IV., where the water supply is principally from wells, the common source of which is springs in the low flat part of the ward and which at the same time receive a great part of the drainage from that part of the city. As seen from the above monthly record the greatest number of cases occurred during September and October, after the summer drought when the wells are at the worst. As the cause of typhoid fever is generally directly or indirectly attributable to the water supply, it has this year as in previous ones, been shown that the consumers of well water are more frequently infected than those who are users of the public water supply, since out of the above 44 cases, 35 were well water users, five both city and well, and four city water users.

Again, we find that in the most thickly populated parts of the city, where once typhoid was prevalent, since the abolition of the wells and replacing them with the public supply, typhoid is of rare occurrence. Thus the gradual extension of this process along with an efficient sewerage system in these infected regions will soon reduce the number of cases to a minimum.

Scarlet fever.—Of this disease, 44 cases with no fatalities, were reported during the year, and although the cases were of a mild type, there is more to be feared from the spreading of this than any of the other contagious diseases, from the fact that a mild case often goes unnoticed, no physician being called in. The child going to school becomes a source of general infection, and since the period of infection exists long after the patient is well and able to be about, it is practically impossible to enforce the required isolation outside a proper hospital; and more particularly is this the case in large families or such places as the children's aid home (where some 17 children are hived together) and from which institution we feared the development of a general outbreak during the last month from an infected child from these attending school, and which undoubtedly proved the source of a number of cases in that locality outside the fire we were fortunate in restricting the number to within the home. Of other cases occurring in the city, ten were apparently due to the accidental infection of a milk supply through the bottles. This matter was speedily remedied and no further developments from that source occurred: other seven cases were directly traceable to direct infection from children playing together during the period of desquamation, which is the most infective period.

Diphtheria and Croup.—During the last year there were reported of the above 32 cases with three deaths, as compared with 42 cases and ten deaths in 1897. Of these four cases with one death occurred in houses previously infected.

Two of the public institutions have been visited by this disease during the year; the institution for the blind, where through the efficient mode of isolation, etc., but three cases developed; and the young ladies' college where one case occurred, but being promptly removed from the buildings no other cases developed. Both the above places received the infection from outside

the city by the return of pupils after the summer vacation. It is with diphtheria that we have been called upon twice during the year to deal with in the way of removal and isolation in different parts of the city, both cases being imported from the outside. Although the disease was prevented from spreading, yet at the same time it was the source of much trouble and annoyance, for to procure the necessary accommodation is next to impossible.

Isolation Hospital.—I wish once more to call the attention of this board and to solicit their prompt action towards the establishment of such an institution, the need of which this city with its increasing population seriously feels, and which to cope successfully with contagious diseases, we must have.

Measles.—This year we have had but two cases, with no deaths, as to 36 cases and two deaths last year.

Of other contagious diseases unclassified in the above there has been seven, with one death, that being from whooping cough.

Public Water Supply.—In this matter of public water supply, which affects to a very great extent the health of a community, we as a city are very fortunate, for not only is there a marked absence of such diseases as typhoid fever in those who use the city supply as compared with the users of well water, but the frequent tests of the Provincial Bacteriologist show the universal good quality of the city supply. For example, I give the last report taken from samples sent during the middle of September, when, if at any time, the report should be the most unfavorable. The results are as follows :

Health Office tap	Bacteria per cc.	20	
Victoria Park tap	"	32	
Alexandria Park	"	50	
Mohawk Institute well No. 1	"	580	
" 2	"	1,970	Suspicious.
" 3	"	350	
G. Hull's well, 208 William St	"	21,960	Very bad.
— Duncan's well, 133 Park Ave.	"	590	
— Bier's well, 216 Park Ave.	"	2,340	Suspicious.
— Yeates' tap (dead end), 227 Chatham St.	"	170	
Dr. Digby's well, Market St.	"	930	

In the matter of dead ends I would recommend that the goose necks used for filling the watering carts be placed on them where possible, and where this cannot be done some means such as a hydrant be adopted to draw off the water from them at least twice a week.

Milk Supply.—Regarding this article of food, which enters to so great an extent in its raw state into the diet of a community, a close watch has been kept over the dairies by periodic inspections and the supply itself by frequent tests. But since milk often forms a good nidus for the development of bacteria, and forms thereby a possible source of infection, too much care cannot be urged on the milkmen, and where bottles are used they should be subjected to sterilization.

Again, as regards the possibility of tuberculosis in cattle being transmitted through milk having been established, the action of this board is to be commended on the stand it has taken in the enforcement upon all milkmen who supply this city the necessity of having their herds and those from which they obtain supplies subjected to the tuberculin test as provided free by the Dominion Government through their veterinary inspectors, and granting permits to only those who can produce from such veterinary inspectors a clean bill of health of his herds, etc.

Sanitary Inspector's Report.—During the year 150 complaints have been filed at this office, all of which have been investigated and satisfactorily disposed of. Besides the above and inspections of premises where there occurred contagious diseases, there have been 200 house to house inspections. There has also been a thorough inspection of all hotels in the city.

All the thirty-two dairies supplying the city have undergone inspection—once in November and December, 1897, and parts of them again in March and July, 1898. The conditions show a marked improvement in the matter of light, ventilation, drainage and general cleanliness of both cattle and byres.!

There have been made from time to time milk tests, the results in a number of cases not being as satisfactory as they should, and the milkmen have been notified to get up to the proper standard or forfeit their permits.

The dairymen have been notified *re* the tuberculin test of herds to be made by Government Veterinary Inspectors, as passed by the board at its meeting in September.

There have been fifty sewer connections made during the year.

There has been a number of water samples collected from time to time during the year to be sent to the Provincial Bacteriologist for examination.

There has been a great many books, etc., from the free library, schools, etc., sterilized from homes where there had been contagious diseases.

In the most of cases where contagious diseases existed, especially diphtheria and scarlet fever, placards have been put up, disinfectants supplied and disinfection done under the supervision and direction of the sanitary inspector.

Fifty privy pits have been cleaned, abolished and replaced by dry earth closets or sewer connection.

There have been issued twenty-five general nuisance notices not included in the above.

(Signed)

J. T. WALLACE,

Sanitary Inspector.

In conclusion I have to regret that other matters have prevented the council from as yet taking any action on the recommendation of this board for a general garbage system, but hope in the near future it, along with the much needed isolation hospital, will be added to the city.

F. G. E. PEARSON,

Medical Health Officer.

N.B.—Since writing this report two new cases of diphtheria have developed at the Institution for the Blind. The rest of the inmates are being subjected to inoculation with antitoxin.

F. G. E. P.

CHATHAM.

REPORT OF MEDICAL HEALTH OFFICER.

November 15th, 1899.

To the Chairman and Members of the Chatham Local Board of Health :

GENTLEMEN,—I herewith submit to you my annual report extending from December 1st, 1898, to December 1st, 1899 :

Contagious Diseases.—The following cases of contagious diseases were reported :

	Cases.	Deaths.
Scarlatina	9	none
Diphtheria	29	1
Typhoid Fever	61	1
Tuberculosis	not reported	
		9

Smallpox.—On September 18th a telegram from the Medical Health Officer of Detroit was received, stating that a veiled woman suspected of having or being exposed to smallpox had escaped their quarantine and started for Chatham.

The woman was located in a Queen street home in a family of four grown-up people and one child. It was found that she was in the seventh or eighth week of the disease, and many of the points of eruption were still covered with scabs, hers being probably the first case carried from Put-in-Bay to Detroit and not discovered by the authorities until the day of her escape here after having infected a number of persons.

The house and individuals in it were promptly quarantined ; the inmates were vaccinated, as well as all others whom we thought might have been exposed. The quarantine was continued for sixteen days. During this time the house was constantly watched night and day by a relay of watchmen and all supplies brought to them. The total extra expense to the municipality in this case was \$95.78.

Scarlet Fever.—There were four distinct outbreaks of this disease in a mild form. Prompt and careful isolation prevented its spread. Total number of cases, nine, with no deaths.

Diphtheria.—There were seven distinct outbreaks of this disease with a total number of cases of twenty-nine with one death. Twenty three were treated at contagious disease hospitals; six at home. The almost universal use of diphtheria anti-toxin has robbed this disease of much of its terrors. The profession and public now realize that when it is used early and in sufficient quantity the danger from the disease is very much reduced. The excellent work accomplished in the contagious wards of St. Joseph's and General Hospitals has not only done much to prevent the spread and accomplish the cure of scarlet fever and diphtheria in this municipality but in all those contiguous to it. The total number treated in these wards were forty-two, with three deaths.

Typhoid Fever.—Sixty-one cases of typhoid fever were reported, with one death. Fifty-one of these habitually used well water only. Eight were attributed to sewer or other ground contamination. In two others the cause was uncertain.

It is gratifying to notice that for the last few years the disease is decreasing, and there is no fact more plainly brought out in our annual reports than that the improvement is owing to the increased number of persons using the city water supply. The number of householders using city water at present is 977. Our city water works is no longer an experiment but a permanent institution. The water is of excellent quality, abundant in quantity, and reasonable in price. There is no longer any excuse for citizens living on streets where water mains are laid, to use well water, which at best is only soakage water of very uncertain quality and questionable origin.

Consumption.—As this disease is not yet reported as a contagious disease it is impossible to make a report as to the number of cases, but a total of nine deaths has been reported for the year.

Total Mortality.—Total number of deaths from all causes, 159. This includes ten still-births.

Death Rate.—16 to 1,000 or 16 per cent.

Sewers.—A number of new sewers have been constructed or are now under way. Five thousand eight hundred feet were ordered by this board as sanitary improvements under the by-law, and 6,799 feet were regularly petitioned for, making a total of 12,599 feet, ranging in size from ten to twenty inches, an average of about fifteen inches.

All of which is respectfully submitted.

WM. R. HALL,

Medical Health Officer.

HAMILTON.

REPORT OF MEDICAL HEALTH OFFICER.

November 15th, 1898.

To the Chairman and Members of the Local Board of Health :

GENTLEMEN,—I beg to report on the sanitary condition of the city for the year ending 31st October, 1898, as follows :

Death Roll.—During the year 734 deaths were recorded, of this number twenty-five were non-residents, which are not included in our mortality. Six citizens died while absent from the city and are included. Our citizen mortality was 709. Taking the population at 51,011 (as given by our assessors) the death rate per 1,000 was 13.87. The previous year gave a death-rate of 11.85, which was exceptionally low.

Deaths from accident number nineteen, of which four were non-residents. There were five cases of suicide, same number as last year. Seven deaths occurred at the House of Refuge, two at Aged Woman's Home (one due to accident), eight died at Home of the Friendless and two at the Jail (one a non-resident hailing from Beverly).

Deaths of children under one year old, 158. One year and under five number 57. Total under five years, 215.

Rate of ward mortality per 1,000 of the population shows—ward one, 11.73; ward two, 15.08; ward three, 11.93; ward four, 14.45; ward five, 16.67; ward six, 13.45; ward seven, 13.99. Wards two and five showing a marked preponderance over the other wards. The pop-

ulation of ward two was 5,832, with eighty-eight deaths, and ward five, 6,416, with 107 deaths. All cases dying in our hospitals are recorded in the wards where they resided previous to admittance.

Contagious Diseases.—The number of contagious diseases have not been very alarming. There were 162 cases of diphtheria reported, which shows a rate of 3.17 per 1,000 of the population were reported, with twenty deaths. Last year only 62 cases were reported with fourteen deaths, whereas this year we have 100 cases more with only twenty deaths. Some physicians might impute this to the use of anti-toxin, but I attribute it to the mildness of the cases, some of which were of doubtful diagnosis. Scarlet fever cases reported were 214, giving a rate of 4.10 per 1,000, with ten deaths. Thirty-seven cases of typhoid fever, or .72 per 1,000 of the population were reported, with six deaths.

The other contagious diseases reported were thirty-five cases of whooping cough, with two deaths (thirty of these cases occurred at the Boy's Home), twenty-three cases of measles, eighty-six cases of chicken pox and eight cases of mumps.

Totals of all contagious diseases number 565, showing a rate of 11.07 per 1,000 of the population.

Garbage.—Dumping grounds no doubt contain the elements of disease and in my opinion it would be advisable to have them covered over as quickly as possible. Indeed the proper thing to do would be to make ground as the work proceeds, instead of scattering the refuse, etc., over a large area.

All flesh and vegetable matter and clothing should be destroyed by cremation; they contribute only in a small degree towards making ground.

An incinerator is a necessity.

Milk Inspection.—I would earnestly direct the attention of your Board to the necessity of having the milk by-law amended. I refer particularly to the latter part of rule 11, referring to giving duplicate samples, which is quite unnecessary, as the Dominion Act sufficiently guards the interests of the milk dealers. The clause is now used as a pretext for not supplying samples in accordance to rule X. Other amendments might also be made in the interests of our citizens.

A few days ago the Dominion inspector was in this city; in company with our milk inspector he visited several cow byres in the county. He gave due praise to some of them while others were stated to be simply abominable. This state of affairs should be rectified by proper inspection. It would seem that inspections made by county officials cannot be depended on.

The inspectors annual statement is appended, as also the usual forms.

Respectfully submitted,

(Sgd.) I. RYALL,
Medical Health Officer.

Hamilton, Ont.,
15th Nov., 1898.

CITY HALL, HAMILTON, November 19th, 1898.

TO DR. RYALL,
Medical Health Officer.

DEAR SIR,—Below please find summary of work by milk inspector from November 1st, 1897, to 31st October, 1898, inclusive:

Number of milk licenses issued, good to April 30th, 1898	206
Samples collected and tested	414
Dairies inspected	193
Cow byres "	168
Shops "	160
Cows reported in a dirty condition and notified to clean	5
Yards dirty and notified to clean	3
Cow byres dirty and notified to clean	1

Respectfully submitted,

(Signed) L. O. MACDONALD,
Inspector.

To DR. RTALL,

Medical Health Officer.

CITY HALL, HAMILTON, November 7th, 1896.

SIR,—Below please find summary of work done by your three inspectors for the year commencing November 1st, 1897, and ending October 31st, 1898, all of which is duly recorded.

Number of inspections made	7,758
“ privy vaults cleaned out by contractors	1,573
“ “ permits given for new ones	31
“ “ abolished	71
“ cesspools cleaned by contractors	24
“ “ permits given for new ones	8
“ dry earth closets notified to be cleaned	50
“ sewer connections notified to be made	17
“ “ found defective and repaired	123
“ foul drains abolished	35
“ stagnant water abolished	25
“ dirty premises cleaned	25
“ other nuisances abated	753
“ old wells filled in	2
“ houses placarded for infectious diseases	260
“ “ fumigated	269
“ loads of refuse delivered at the dump by scavengers	7,504
“ “ from hospital burnt at crematory	54
“ parcels, bedding, etc., from infected houses burnt at crematory	13
“ dead animals collected and buried by D. McBride—dogs, 194; cats, 82; fowls, 33	309

(Signed)

J. PEACOCK,

Inspector.

Hamilton Contagious Disease Report for 1897-98.

Month.	Diphtheria.		Scarlet fever.		Typhoid fever.		Measles.	Chicken pox.	Whooping cough.	Mumps.
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.				
November	17	2	9	1	2	1		17		1
December	14	2	5		11		1	16		
January	24	3	14	1	2			17		1
February	6	2	33		2	1	1	13		
March	10		39	2	4	1		3		
April	4		18	1	1		1	2	1	1
May	6		34	2		1	4	3	4	2
June	27	5	9		1		5	8		3
July	17	3	16	3	1		8	2	30	
August	7		9		4		2			
September	6	1	16		6		1	2		
October	24	2	12		3	2		3		
Totals	162	20	214	10	37	6	23	86	35	8

Diphtheria, Scarlet Fever, Typhoid Fever.

	1	2	3	4	5	6	7	By wards.
Diphtheria	12	4	6	21	34	58	27	162
Scarlet fever	5	25	26	38	24	51	45	214
Typhoid fever	2	7	3	5	2	7	11	37
Totals	19	36	35	64	60	116	83	413

Hamilton Mortuary Statistics of Residents for year 1897-98.

Year 1897-98. Monthly statement.	Total burials Hamilton cemetery.			Hamilton cemetery.			Holy sepulchre.			Still born.	Other burial grounds of all denominations.			Total city mortality of all denominations.			Still born all denominations.
	Totals.	non- resident.	Still born.	Citizens.	Males.	Females.	Citizens.	Males.	Females.		Citizens.	Males.	Females.	Citizens.	Males.	Females.	
November	43	4	6	33	17	16	7	2	5	....	9	6	3	49	22	27	6
December	58	13	5	40	22	18	12	7	5	....	6	5	1	58	34	24	5
January	59	4	3	52	26	26	11	6	5	....	5	3	2	68	35	33	3
February	46	6	4	36	12	24	11	4	7	....	8	3	5	55	19	36	4
March	62	13	4	45	23	22	22	9	13	1	5	2	3	72	34	38	5
April	75	12	4	59	34	25	10	5	5	....	9	5	4	78	44	34	4
May	47	8	5	34	18	16	6	3	3	....	12	7	5	52	28	24	5
June	55	9	2	44	23	21	8	4	4	1	10	5	5	62	32	30	3
July	47	7	4	36	16	20	8	4	4	....	4	1	3	48	21	27	4
August	48	10	3	35	15	20	10	5	5	....	4	3	1	49	23	26	3
September	53	10	3	40	20	20	12	4	8	1	12	5	7	64	29	35	4
October	47	11	....	36	18	18	14	10	4	1	4	1	3	54	29	25	1
Totals	640	107	43	490	244	246	131	63	68	4	87	43	44	709	350	359	47

Deaths by Wards and Months.

—	1	2	3	4	5	6	7	Total.	Population and death rate per 1,000.	
November	2	7	7	13	5	6	9	49	1—4,772	11.73
December	3	6	7	7	9	14	12	58	2—5,832	15.08
January	10	11	10	7	11	9	10	68	3—8,179	11.93
February	5	10	3	16	8	7	6	55	4—7,658	14.45
March	3	7	8	10	15	15	14	72	5—6,416	16.67
April	7	7	16	14	11	9	14	78	6—9,367	13.45
May	4	8	6	4	9	12	9	52	7—8,787	13.99
June	2	13	9	5	11	15	7	62		
July	3	4	7	5	8	8	13	48		97.30
August	4	4	6	11	6	10	8	49		
September	7	8	9	11	7	9	13	64		
October	6	3	10	8	7	12	8	54		
Totals	56	88	98	111	107	126	123	709	Average	13.90

KINGSTON.

REPORT OF THE MEDICAL HEALTH OFFICER.

December 31st, 1898.

To the Chairman and Members of the Local Board of Health :

GENTLEMEN,—I beg to submit the annual report of the sanitary condition of the city, for the year 1898.

Report of Contagious and Infectious Diseases reported.

	Typhoid fever.	Diph- theria.	Scarlet fever.	Whooping cough.	Mem. croup.
January	1	3	1		
February		7			1
March					
April	1	1			
May		4			
June		3	1		
July	1	1			
August	1	1			
September	3				
October		2			
November	3	9			1
December		8			
Total	10	39	2		2

Sanitary Inspections.—The following is a summary of the sanitary work performed during the year :—

Number of permits issued to clean privy vaults	564
Number of cubic feet night soil removed from	21,000
Number of privy vaults filled up with fresh earth	17
Number of privy vaults shallowed to 2½ feet deep	19
Number of privy vaults inspected during the year	2,749
Number of privy vaults reported clean	2,404
Number of privy vaults reported dirty	345
Number of yards and premises inspected during the year	3,881
Number of yards and premises reported clean	3,684
Number of yards and premises reported dirty	197
Number of cellars inspected during the year	2,978
Number of cellars reported clean	2,893
Number of cellars reported dirty	14
Number of cellars reported damp	71
Number of water closets reported in use	832
Number of dry-earth closets inspected	452
Number of dead animals removed from streets, etc	107

Ice.—The ice supply is regulated by provisions laid down by the Local Board of Health. That for domestic purposes is required to be cut in deep water 1,200 from shore, where it is free from sewerage or any other impurity likely to contaminate. For cooling purposes only ice may be obtained in any other section, on permission direct from the Board itself.

All places of storage used, or intended to be used, for domestic or cooling purposes, within the municipality, are subject to inspection by the Medical Health Officer or Sanitary Inspector, and must be clean, wholesome and properly drained and ventilated.

Milk Supply.—The milk supply is at present derived from sixty-three dairies, containing 665 milch cows. Every one of these dairies has been inspected during the year, with regard to the health, food and water supply of the cattle, cleanliness of the byres, drainage, ventilation, light, storage of milk, utensils, etc. The report shows an improvement in the herds, their condition and cleanliness. Samples of milk from the dairies are tested periodically.

Night Soil.—Removal of night soil is done by four scavengers, who are required to have appliances suitable for the carrying on of the work. No pits are allowed to be more than 2½ feet deep (according to by-law), and under no circumstances can pits be partially emptied; they must be thoroughly cleaned, limed and disinfected. The work is required to be done in the day time, except in special cases when permission is granted by special order.

The removal of garbage has become a regular business with persons living outside of the city; so that very little is left for the city scavenger to look after.

Sewerage.—There was constructed during the year $\frac{3}{4}$ of a mile of trunk sewers. This additional drainage will improve the sanitary condition of the city.

Flushing of Sewers.—Complaints of foul smells from the corner gratings have been frequent. In most cases it has been found that decomposing organic matter exists in the sewers, and that flushing is necessary for its removal. The engineer's department is at once notified of the fact, and flushing is at once done. In certain parts of the city the evil is more common and it would be well if a general flushing was done systematically, especially where there is little, or sluggish, flow through the sewers.

It is gratifying to state that the police constables, told off to assist the health department, during the year, in carrying out the work, did good service, and that their aid is duly appreciated.

In conclusion let me say that the location of our city is one naturally highly favorable, from a sanitary point of view. The deaths from contagious diseases this year are as follows:—Typhoid Fever, 3; Diphtheria, 1; Mem. Croup, 1; Whooping Cough, 2. With a good water supply (which we have), and our drainage system completed Kingston will be a healthy city.

I have the honor to be,

Gentlemen,

Your obedient servant,

SAMUEL H. FEE,

Medical Health Officer.

LONDON.

REPORT OF MEDICAL HEALTH OFFICER, ALSO REPORT OF COMMITTEE ON CONSUMPTION.

November 15, 1898.

To the Chairman and Board of Health:

GENTLEMEN,—I have the honor to lay before you my annual report upon the sanitary condition of the city, death rate and other matters relating to the public health for the year ending November 15th, 1898.

The number of deaths during the year was 472, twenty-four of these being due to the lamentable accident at the city hall in January. This does not include twenty-one still-born, which, never having had a separate existence, cannot be counted in mortuary statistics.

Two hundred and ninety-five cases of infectious diseases occurred in the year, as follows:—

Scarlet fever.....	114
Diphtheria.....	108
Typhoid fever.....	46
Consumption.....	26

The last disease is not reported to the health office.

One hundred and ninety-seven cases of infectious diseases were sent to the General Hospital, viz.:—

Typhoid fever.....	29 and 1 death.
Scarlet fever.....	55 and 5 deaths.
Diphtheria.....	87 and 3 deaths.
Consumption.....	26 and 2 deaths.

St. Joseph's Hospital received seventeen cases of typhoid fever, with two deaths.

There were ninety-nine deaths from consumption, and fifty-four from all the other infectious diseases combined.

Leaving out consumption it will be seen that of the remaining 188 cases treated in the General and St. Joseph's Hospitals there were only eleven deaths, or a mortality of not quite six per cent.

As patients outside the hospitals are attended by the same physicians as those in the hospitals, the great difference in the death rate in favor of the hospitals can only be accounted for by better sanitary surroundings and better facilities for combating disease, which are not always within reach of the sick in their own dwellings. There is also the fact that several cases sometimes occur in succession in the same dwelling, the first one only being reported.

Of the 472 deaths in the city, consumption is given as the cause of ninety-nine, or more than one-fifth of the number.

At the convention of the Medical Health Officers held in Ottawa in September last, it was shown that there were 3,000 more deaths in the Dominion last year from consumption than from all the other infectious diseases put together, and that in Ontario one person in every 1,000 died annually from consumption. The province last year lost 2,500 wage-earners, and a direct loss of \$2,500,000, and an indirect loss impossible to estimate.

Consumption is contagious, and, therefore, much can be done in the way of prevention.

In this connection the recommendations of the committee appointed by your Board are of such importance to the public that a printed copy should, if possible, be placed in every family, and I would suggest, as the best means of accomplishing this, that these recommendations and instructions to the public be printed on the backs of the assessment commissioners' slips left at each dwelling, and would then unfailingly reach every householder in the city.

There are three clauses in the recommendations of your committee which should be incorporated in the city by-laws relating to public health, or in the Ontario Public Health Act. They are as follows:—

1st. Physicians should report all cases of consumption to the Medical Health Officer for purposes of record, but the placarding of houses where such patients live is not required.

2nd. All deaths from consumption and chronic bronchitis should be promptly reported by the physicians to the Medical Health Officer, so that he may order and superintend such means of disinfection as he may deem necessary, and the city clerk should refuse to issue burial certificates in cases of consumption until the death certificate has been endorsed by the Medical Health Officer.

3rd. Managers of free libraries and other public and Sunday school libraries should not issue books to consumptive patients or their families, and their officials are requested to have printed on their library cards a notice to this effect, "No books will be issued to persons residing in any house where there is a case of consumption, diphtheria, scarlet fever, typhoid fever or other infectious disease."

Cancer caused the death of thirty-five persons. The number of people dying from this disease is, in proportion to the population, increasing every year.

The proposed by-law respecting the sanitary plumbing of buildings is still in abeyance. An excellent plumbing by-law was formulated by the Board of Health and master plumbers of the city. A by-law regulating house plumbing is very much needed in the interest of public health, and it is to be hoped that next year's city council will see their way to pass this by-law.

During the year West London, with a population of 1,885, was annexed to the city, making the population of London now 38,575. The increase in the population of the city during the year, exclusive of London West, was 466. This is a very satisfactory increase and shows the steady growth of the city.

A report upon the condition of herds, dairies and the quality of milk supplied the city during the last six months will be laid before you this month.

The sanitary condition of the city has been very good, and it gives me great pleasure to again report an exceedingly low death rate—12.3 in every 1,000 of the population. This is the same as last year, and when the new system of trunk sewers shall have been completed there is every prospect of this death rate being reduced still lower.

Your obedient servant,

T. V. HUTCHINSON, M.D.,

Medical Health Officer.

Cramming in the Schools.—Prof. Bowman moved that the Board approve of the action of those medical men who agitated the question of the over-taxation of pupils in the city schools by giving them more homework than was consistent with their health. Mr. Bowman said the evil had become so great it was necessary that something should be done.

The motion was approved, and a suggestion by Mr. Pritchard that Prof. Bowman, Dr. Campbell and the mover be a committee to confer with the School Board on the matter, will be carried into effect.

The Board approved of the action of city medical men in speaking against the cramming methods prevailing in the public schools.

Alderman Taylor presided, and also present were Prof. Bowman, Messrs. Christie and Pritchard, Dr. Campbell and the Board officials.

The report of the committee on consumption was as follows :—

Consumption is the most prevalent and the most fatal of diseases in Canada. Last year in the Dominion there were 3,000 more deaths from consumption than from all other infectious diseases. In Ontario one person in every 1,000 dies annually from consumption. Last year the province lost 2,500 wage-earners from this disease—which means a direct loss of \$2,500,000, and an indirect loss of an almost incalculable sum besides. In London this year out of 472 deaths ninety-nine were from consumption, and fifty-four from diphtheria, scarlet fever and typhoid, so that about twice as many died in this city from consumption as from all other infectious diseases. Two deaths in every nine were from consumption.

Consumption is contagious, therefore, many deaths from this disease might be prevented. It is also curable in many cases when taken in time.

The hygienic remedies for consumption are pure air and pure food. To secure proper treatment for the majority of people, sanatoria in rural districts are recommended—institutions to which consumptives can be sent as soon as the disease is detected, where they can receive proper care, while at the same time their families and homes can be protected from contagion. This work will have to be done by municipalities, with such aid as may be received from philanthropists. As London has taken on itself a heavy burden this year in the matter of hospital construction, it cannot be expected for some time to do anything in the way of a consumptives' sanatorium. But there is a great opportunity here for private effort by the citizens in this respect, following the example of Toronto, which has lately appointed a local committee to proceed with the establishment of a sanatorium. The only one at present in operation in Ontario is situated in Gravenhurst.

Meanwhile, there are duties and responsibilities resting upon citizens and municipalities alike, the careful observance of which cannot but result in great benefit on the community and the saving of many lives.

As the poisonous germs of consumption are disseminated largely through the dried sputa, or matter expectorated by diseased persons, special care should be taken with this substance to prevent the spread of contagion.

There should be no spitting in public buildings, conveyances or on the streets. Persons with cough should always use a handkerchief or vessel provided for the purpose. The former should be burned and the latter purified frequently by some strong disinfectant. In street cars and other public conveyances, and in public buildings placards forbidding spitting should be posted, and a sufficient number of spittoons provided. These spittoons should be cleaned daily with boiling water and a strong disinfectant.

In order further to avoid danger from infected dust the rooms occupied by consumptives should have no carpets or unnecessary furniture, ornaments, curtains, etc. The floors should be wiped with a damp cloth, and no broom used. The room should be frequently disinfected, invariably after the death or removal of a patient.

As consumption may be conveyed through meat and milk, special care should be taken by the Board of Health and its officials that no diseased articles of food are sold. It is further advised that milk should be boiled before it is used.

Physicians should impress upon all consumptive patients and their friends the communicable nature of the disease. They should report all cases to the Medical Health Officer for purposes of record, but the placarding of houses where such patients live is not required.

The managers of the free library and all other public and Sunday school libraries should issue no books to consumptive patients or their families, and these officials are requested to have printed on their library cards an announcement to the effect that "no books will be issued to persons residing in any house where there is a case of consumption, diphtheria, scarlet fever, typhoid fever or other infectious disease."

The Medical Health Officer shall report monthly to this Board the deaths from consumption and other infectious diseases.

The city council is requested to amend its by-laws wherever necessary to assist in carrying these recommendations into effect.

The report was received and adopted.

OTTAWA.

REPORT OF THE MEDICAL HEALTH OFFICER.

Dec. 19th, 1898.

To the Chairman and Members of the Local Board of Health :

GENTLEMEN,—I beg to lay before you the annual report of the Health Department for the year ending 31st October, 1898.

In so doing I have to crave your indulgence and apologize for its brevity and incompleteness owing to causes too well known to every member of your board to need repetition here. I am pleased, however, to record the fact that during the period comprised in this report the public health has been generally good, as evidenced by a smaller death rate than that of the previous year, notwithstanding our large increase of population.

Mortality.—The total mortality for the year just ended, exclusive of still-births, was 1,122, that of the previous year, 1,128.

This, with our estimated population of 56,000, gives us a death rate of 20.3 per thousand, a very fair showing, I submit. 556 out of the total mortality were of children of five years of age and under, including for the period the death roll of the foundling institution, the House of Bethlehem.

Contagious Diseases.—With the exception of measles, an epidemic of which prevailed during the spring months, and cerebro spinal meningitis, cases of which were apparently more common than usual, we have had during the past twelve months less zymotic diseases than in the past three or four years. It is quite evident however, as shown in Table I here appended, that among constitutional diseases, phthisis or consumption, is still by far the largest factor in the make up of our death roll as a cause of death, and every community throughout the civilized world is hopeful that in the near future some effective practical means will be devised to stay the ravages of this fell destroyer.

Table II here attached shows the number of cases of infectious diseases admitted into the isolation hospitals, and the very satisfactory results obtained by the treatment applied or received here.

Tables III and IV here appended show respectively the number of infectious diseases reported in the health office, and the records of the House of Bethlehem for the past year. I regret to say, however, in connection with the former table, that excepting as regards diphtheria and scarlet fever, the figures there recorded are not strictly reliable, owing to the fact that physicians still continue remiss in reporting such cases as typhoid fever, measles, mumps and whooping cough, that occur in their practice.

Ice Inspection.—The ice dealers of this city have willingly complied with the regulations of your board in taking their supplies either from the Ottawa river or from the Gatineau river.

Milk Inspection.—In the early part of the year sixty-four samples of milk taken from the different milk vendors of this city were tested by me with the result that fifty-six samples were found satisfactory and classed as good milk and eight samples as poor milk, and below average as regards butter-fat. In order to protect the consumer in this very important article of food, it is to be hoped that the by-law enacting the production of a certificate of the application of the tuberculine test to dairy farm cattle before the obtaining of a license, passed by the corporation last year, will be amended by the council so as to facilitate its effective enforcement without unnecessary onerous conditions to the milk vendors.

Owing to the dismissal of the sanitary inspector by the council about the last of the summer, an action which, by the way, I cannot but look on as as not unjustified, I am unable to give any details of the work which more particularly pertained to that officer.

In conclusion it is my unpleasant duty to protest against the unfair treatment which your board has been subjected to by the council of the year just ending, as calculated to impair its usefulness to a very large extent, and to retard the initiation of such sanitary improvements the want of which had been felt for many years.

Respectfully submitted,

A. ROBILLARD, M.D.

TABLE I.

Total mortality from all causes during the year 1898.

Diseases.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total.
Appendicitis										1	2		3
Asphyxia									1				1
Apoplexy	1		1	3	1	1		2		2	2	1	14
Anæmia				1		3				1		1	6
Abscess			1				1						2
Angina pecto.					1								1
Accidental:													
By cars	1		2		1	1		2	1	1			9
" burns		6						1			1	1	9
" falls					1		1			1			3
" strangulation			1										1
" falling of shed				1									1
" drowning	2						3		3	1			9
Bronchitis	3	2	2	4	2	8	5	3	3	2	2	6	42
Bright's disease	1	1			2			1		1			6
Congenital malformation			1				1	1		1	1		5
Child birth									1	1			2
Cerebritis	1			1			1		1				4
Cancer	3	4	2	4	2	1	1	3	2	5	2	6	35
Cystitis	1		1		1	1			1	1	1	1	8
Cholera nostras									2	2			4
Diphtheria	1	3	3	3	2	3	4	4			1		24
Dropsy	1				1		2	2			2		7
Diabetes		1			1				2	1		2	7
Erysipelas			1			1				1			3
Eclampsia	1												1
Epilepsy		1				1	1			2		1	6
Gastro enteritis	2	1	1	3	3	5		3	4	2	2		26
General debility:													
Senile		1	2	6	2	2	3	1		1	2	3	23
Infantile	4	1	3	2	5	2	2	2	2	2	1	2	27
Heart disease	4	7	4	3	2	3	2	3	8	3	8	4	51
" failure	2	1	1		1	1	1	1			1	1	9
Hepatitis			2			1		1	1		1	2	8
Hydrocephalus			1			1			1	1	1		4
Hemorrhage	1	1		1	2		2	2			3	2	14
Insolation									1		1		2
La grippe		1		1									2
Laryngitis				1	1								2
Meningitis	1	1	4		3	3	6	4	5	5	1	2	35
Myetitis			1										1
Nephritis	2	2	3	2					1		1	1	12
Old age	2	4	1	2	3	2	3	4	2	3	3	2	31
Pneumonia	9	4	6	4	8	11	12	4	7	7	3	7	82
Peritonitis		2	3	5	2	4	3	1	5	4	2	1	32
Puerperal fever			1										1
Paralysis	2	4	2		4	7	3	6	2	2	4	4	40
Pertussis	1	1	2	3						1	1	2	11
Pleurisy						1							1
Premature	1	2	5	3	8	2	6	3	2	1	3	2	38

TABLE I.—Continued.

Total mortality from all causes during the year 1898.

Diseases.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total.
Rheumatism		1											1
Scarlatina		1		1		2	1	1					4
Septicemia	3	1	1		2	1	1	1		2			12
Syncope			1				1	1		1	1	2	7
Scrofula					1			1	1	1			4
Surgical shock						1	1		1				3
Suicides	2	1			2			1					6
Typhoid fever	2	1					2		2	3	2	5	17
Tetanus		1								1			2
Tumour								1	1	1	1	1	5
Tuberculosis	8	9	10	8	12	19	9	11	13	11	5	12	127
Diarrhoea and other diseases inci- dental to dentition..... {	7 2	5 7	3 4	5 3	7 4	7 13	12 5	26 7	60 12	33 8	12 6	6 9	} 263
Uræmia		1		1	1					1	1		
Totals	71	79	76	71	88	107	94	103	149	118	77	89	1,122
Exclusive of still-births	5	7	8	7	5	6	4	9	7	8	7	8	81

TABLE II.

Showing the number of patients treated in the Isolation Hospitals and death rate during the year ending October 31st, 1898.

Distribution.	Protestant Annex.					R. C. Annex.				
	Diphtheria.	Folicular tonsillitis.	Scarlatina.	Suspected scarlatina.	Measles.	Diphtheria.	Folicular tonsillitis.	Scarlatina.	Suspected scarlatina.	Measles.
Admitted during year	93	3	16	4	8	88	3	37	2	10
Discharged "	84	3	16	4	8	81	3	35	2	10
Deaths "	9					7		2		
24 of the above recorded cases were from outside the city.					11 of the above recorded cases were from outside the city.					

Though the mortality here recorded is not very large, still it is larger than it would be under ordinary circumstances, owing to two facts : 1. The very large percentage of croupal or laryngeal cases treated in the hospital during the past year, over one-quarter of the number of cases admitted being such. 2. The fact that quite a few of these cases came to the hospital in a moribund condition, and died a few hours after their admission.

TABLE III.

Showing number of infectious diseases reported at the Health Office during the year 1898.

Diseases.	No. of cases.
Diphtheria, including croup	149
Scarlet fever	48
Measles	131
Typhoid fever	195
Total	523

TABLE IV.

Record of the House of Bethlehem for the year 1898.

How disposed of.	No. of cases.
Admitted during the year	249
Placed outside or returned to parents	100
Died during the year	122
Remaining in House on November 1st, 1898	27
Total	

ST. CATHARINES.

REPORT OF THE MEDICAL HEALTH OFFICER.

November 15th. 1898.

To the Mayor and Council of the Corporation of the City of St. Catharines:

GENTLEMEN,—In accordance with the requirements of the Public Health Act, I herewith submit my annual report of the sanitary condition of the city for the year ending the 15th day of November, 1898.

Contagious Diseases.—An outbreak of a mild type of scarlatina and German measles in October, occurring principally among pupils attending one of the schools situated in the Ward of St. Andrew, rendered it expedient in the opinion of the Board of Health to close the public and separate schools in the ward, as well as the Sunday schools, in order to prevent the danger of these affections becoming epidemic.

The trustees of the public schools very properly availed themselves of this opportunity to have the class rooms thoroughly cleansed, and disinfected, and to render more perfect the ventilation and sanitary surroundings. I am of the opinion that, owing to the existence of a substratum of quicksand beneath the foundation of the school premises at the junction of Church and William streets, a drain should be constructed to carry the subsoil water into the Ontario Street sewer, in addition to what has already been accomplished in the way of sanitary improvement.

Sewerage.—I desire to congratulate the Mayor and Council and the citizens generally on the progressive extension of the system of drains and sewers, and of the installation of the "Miller Automatic Flush Tank," without which no thorough and systematic cleansing and ventilation of the sewers can be accomplished; as the occasional flushing with hose, although useful at the time, is not repeated often enough to prove efficient in removing the decomposing deposits that accumulate in the interim. It is necessary that the sewers should be flushed every day in order to remove effectually these deposits, and to prevent the sewers becoming elongated cesspools which generate offensive and noxious gases.

It is encouraging from a sanitary standpoint that nearly all the newly erected residential buildings have been connected with sewers wherever it is possible to do so; and it would be of great advantage to the health and comfort of those concerned if cesspools could be entirely abolished in the case of houses situated on streets furnished with sewers.

Nearly every year complaint is made of the peculiar milky appearance, and disagreeable odor and taste of the city water. As this condition of things led some of our citizens to fear that the water was unwholesome, I sent samples of it on two occasions to Dr. McKenzie, the Bacteriologist of the Provincial Board of Health, for analysis; and am pleased to be able to state that his report on both occasions was satisfactory. He assured me that the city water was "good public water," and that it was devoid of any pathogenic germs.

The attention of the Board of Health having been called to the proposed intention of the authorities of the Township of Humberstone, in the County of Welland, to drain the swamp lands lying east of the Welland canal into that channel, an act which would tend to pollute the waters of the canal, and injuriously affect the purity of the water supply of this city, I communicated the facts to Dr. Bryce, the Secretary of the Provincial Board of Health, and that gentleman promised to take prompt action to protect us. He has faithfully, and I hope successfully, given effect to this assurance; and I consider that he is entitled to the cordial thanks, not only of the citizens of St. Catharines, but also of those of Welland and Merriton, whose sanitary interests were threatened by the proposed tapping of the canal for drainage purposes.

The Sanitary Inspector and Secretary of the Board have faithfully discharged their respective duties. Their reports are herewith submitted.

On consulting the accompanying report of the Secretary it will be observed that the total number of deaths from all causes occurring in the city from the 15th November, 1897, to the 15th November, 1898, was 165. Deducting from this number the deaths from old age, premature births, and accidents, twenty-five in all, I find the rate of mortality, calculated upon a basis of population of 10,274, is 13.60 per 1,000 of inhabitants.

Respectfully submitted,

E. GOODMAN, M.D.,

Chairman.

REPORT OF SANITARY INSPECTOR.

To the Chairman and Local Board of Health of the City of St. Catharines:

GENTLEMEN,—I have the honor herewith to submit my annual report (as Sanitary Inspector of your honorable Board) for the year ending November 15th, 1898, and say:—

That I have placarded 33 houses during the year, in compliance with the medical returns of contagious diseases.

I have frequently visited the cow-byres, slaughter-houses, livery and hotel stables, canning and other factories within the city when necessary, and have found them generally in a cleanly and sanitary condition.

The city sewers have been frequently flushed during the year, and have been disinfected when necessary.

The streets, lanes and yards have received my strict attention, and I am pleased to say that they have been kept clean generally.

The city scavengers have removed about 1,000 barrels of night soil during the year, and the work has been well and thoroughly done.

I have tested the milk sold by the vendors thereof, and the average registration has been 90 and 92, and no complaints of the quality has been made.

I have made 1,060 house to house inspections during the year, and am pleased to say that I was kindly received by all persons in connection therewith, who showed a willingness to comply with all orders and instructions in regard to sanitation.

I have made weekly visits to our City Isolated Hospital during the year, and have pleasure in saying that the said institution is in good order and condition, and ready for use should necessity require it at any time.

Respectfully submitted,

A. BOULDEN,

Sanitary Inspector

ST. CATHARINES, 17th November, 1898.

REPORT OF SECRETARY.

To the Chairman and Local Board of Health of the City of St. Catharines:

GENTLEMEN,—Herewith I have the honor to submit the annual statement of the number of deaths in the City of St. Catharines from November 15th, 1897, to November 15th, 1898, and the causes thereof; also statement of the number of contagious diseases for the same period as per medical returns:—

Deaths.

Diseases.	Number.	Diseases.	Number.
Bright's Disease	3	Croup	2
Bronchitis	12	Heart disease	22
Apoplexy	3	Cyanosis	1
Consumption	17	Nephritis	1
Spinal disease	2	Cystitis	2
Inanition	4	Inflammation of lungs	1
Pneumonia	12	Hæmoptysis	1
Cerebritis	1	Peritonitis	4
Intestinal obstruction	1	Accident	5
Old age	4	Premature birth	10
Convulsions	4	Anæmia	1
Still-born	4	Typhoid fever	4
Syncope	2	Morbis cordis	1
Inflammation of bowels	3	Marasmus	1
Paralysis	4	Blood poison	1
Gastritis	1	Ulcers	1
Tumor	1	Shock	2
Puerperal fever	2	Enteritis	1
Pericarditis	1	Tetanus	1
Malaria fever	1	Cholera infantum	2
Meningitis	3	Rheumatism	2
Exhaustion	1	Whooping-cough	1
Diarrhea	2	Diabetes	1
Cancer	2	Diphtheria	1
Asphyxiation	1	Indigestion	1
Scarlet fever	1		
Tranmatic œsophagitis	1		
Appendicitis	2	Total	165

Contagious Diseases.

Reported.	Number.	Deaths.	Number.
Scarlet fever	41	Diphtheria	1
Typhoid fever	4	Scarlet fever	1
Diphtheria	4	Typhoid fever	4
Measles	3	Whooping-cough	1
Whooping-cough	1	Consumption	17
Mumps	5		
Consumption	17		
Total	75	Total	24

I have the honor to be your obedient servant,

J. ROLLISON,

Secretary.

ST. CATHARINES, 17th November, 1898.

ST. THOMAS.

REPORT OF THE MEDICAL HEALTH OFFICER.

ST. THOMAS, 1st April, 1899.

To the Chairman and Members of the Local Board of Health :

SIR,—In compliance with the requirements of the Public Health Act I have the honor to submit the annual report for the city of St. Thomas for the year Dec. 1st, 1897, to November 30th, 1898 :

The sanitary condition of the city has been good. Since the construction of sewers in almost every street and the provision of a sufficient supply of pure water typhoid fever and dysentery are of rare occurrence. We have at present upwards of twenty miles of sewers, and during the year another half mile has been added. They all empty into a common trunk sewer. I hope soon to be able to report that every street is properly drained.

The pit system is still in use to some extent, but gradually water closets are taking their place. As we are not using well water there is no contamination of water by pits and out door privies, the only injury being a noxious state of the atmosphere at night. The reason we do not require all householders to adopt the water closet system is that on a few streets there are, as stated, no sewers, and therefore no proper method of carrying out that system.

— Following is the number of contagious diseases placarded during the year, and also the total number of deaths from other causes :

	Cases.	Deaths.
Diphtheria.....	36	2
Scarlet fever	22	1
Typhoid fever.....	2	2
Tuberculosis	..	13
		— 18

I have no means of knowing the number of cases of tuberculosis.

The number of deaths from other causes than contagious diseases was 102, making in all 120 deaths in a population of 11,250, or 10.66 per 1,000.

WM. C. VANBUSKIRK,
City Physician.

STRATFORD.

REPORT OF THE MEDICAL HEALTH OFFICER.

STRATFORD, November 1st, 1898.

To the Chairman and Members of the Local Board of Health :—

GENTLEMEN,—In submitting my report upon the sanitary condition of the city for the past year, I have pleasure in stating that our total mortality during that time was not materially increased from that of previous years.

Deaths.—The total number of deaths during the year was 89.

30 occurred in Romeo Ward.	Between 80 and 90.....	11 died.
24 " " Shakespeare Ward.	" 70 " 80.....	8 "
13 " " Avon Ward.	" 60 " 70.....	9 "
13 " " Falstaff Ward.	" 50 " 60.....	12 "
9 " " Hamlet Ward.	" 40 " 50.....	7 "
	" 30 " 40.....	6 "
	" 20 " 30.....	12 "
	" 15 " 20.....	4 "
	" 10 " 15.....	3 "
	" 5 " 10.....	4 "
	" 1 " 5.....	5 "
	Under 1 year.....	7 "
	Age not given.....	1 "
	Total.....	89 died.

Cause of death as given.

Consumption.....	14	Apoplexy.....	1
Heart failure.....	8	General debility.....	1
Cancer.....	8	Croup.....	1
Old age.....	9	Bright's disease.....	1
Pneumonia.....	6	Lang trouble.....	1
No cause given.....	6	Insane.....	1
Accident.....	5	Asthma.....	1
Typhoid fever.....	2	Paralysis.....	1
Diphtheria.....	4	Convulsions.....	1
Scarlet fever.....	1	Kidney disease.....	1
Measles.....	1	Endocarditis.....	1
Rheumatism.....	2	Liver complaint.....	1
Diarrhoea.....	2	Congestion of brain.....	1
Appendicitis.....	2	Operation.....	1
Inflammation of bowels.....	2	Growth on head.....	1
Dropsy.....	1		

Of the infectious diseases there were : Typhoid fever, 18, with 2 deaths ; diphtheria, 32, with 4 deaths ; scarlet fever, 17, with 1 death.

Consumption.—Consumption still heads the list as regards the number of deaths. It is gratifying to know, however, that the public, as well as the medical men, are becoming alive to the fact that the disease is communicable from one to another. It is now being classed amongst the infectious diseases. Physicians and scientists, not only in this country but also in European countries as well as in the United States, are doing all in their power towards the devising of ways and means to combat tuberculosis. In the monthly report issued by the Provincial Board of Health for September, the deaths from contagious diseases in the Province, as reported to the Registrar-General by the division registrars, throughout the Province 250 deaths were reported : 11 died from scarlatina, 33 from diphtheria, 44 from typhoid fever and 147 from tuberculosis, or 0.8 per 1,000 per annum, while the next highest, typhoid fever, was 0.2 per 1,000. The co-operation of societies having for their object the promotion of public health, the assistance of the public press, and the influence of legislation, will all be required to successfully carry out the desired end.

During the early part of the year we seemed to have been threatened with an epidemic of that much dreaded disease diphtheria, but strict vigilance on the part of your Inspector, together with the assistance of the medical attendants, in seeing that proper precautions were taken as regards isolation and disinfection, prevented its spread. Since the introduction of anti-toxin in the treatment of this disease a few years ago, a remarkable diminution has taken place in the mortality, only four deaths occurring out of the thirty-two affected.

Sanitary Inspection.—The usual amount of sanitary work was done, a general house to house inspection was made ; the water supply in houses where contagious diseases existed was examined ; the several dairies were visited, and the milk supply from time to time received attention, and on all occasions found satisfactory.

Sewerage.—The Sewer Committee reports satisfactory progress towards sewer extension, and the arriving at a satisfactory method of sewerage disposal. The uncalled for action of a neighboring municipality in menacing private individuals and institutions by dragging them into expensive lawsuits, when its Council was struggling earnestly with this important and hard to-be-decided problem, merits censure rather than commendation.

J. A. ROBERTSON,
Medical Health Officer.

WINDSOR.

REPORT OF THE MEDICAL HEALTH OFFICER.

Dec. 1st, 1898.

To the Members of the Board of Health :

GENTLEMEN,—In presenting this, my annual report, I desire to say, by way of premise, that I have endeavored to avoid duplicating any portion of the reports of the secretary and the sanitary inspector.

I had noticed that on more than one occasion the secretary's report overlapped ground already traversed by the medical health officer and, believing that this tended to weary those who may be interested enough to peruse them, I requested those officers to present full reports upon the work covered in their respective spheres, so that nothing should be overlooked in this mode of reporting.

In dealing in this manner with the business of the year, I feel freer to draw your attention to what has been left undone, rather than to what has been effected ; and I do so at considerable length for the reason that the subjects included in the former were more varied, more subtle in the undermining of the public health and less readily grasped, on the nonce, by the average citizen.

To illustrate this point, I need only mention the fact that milk from tuberculous cows may be entering households that know nothing, by actual experience, of the deadly sewer gas (for want of a connection with our sewer system), nor are in danger from water-borne microbes or bacilli by reason of their using filtered or boiled water only.

In this connection, I would introduce an address prepared for my first meeting, officially, with this board, but which I did not then present because of the manner in which I was greeted on that occasion.

I have recently gone over the ground again, in the added light of observation and the study of the reports of the Provincial Board of Health, the reports of the Medical Health Officers throughout the Province, and the papers read before the meetings of the association of those officers, and I find that that address contains much that calls for your attention in the immediate future. I accordingly submit it as part of this report.

With regard to the inspection of the cow-byres and dairy farms, I can but conclude that, up to the time of the visit of Mr. Kidd, it had been but little short of a farce ; and considering it such, I deemed it my duty to draw your attention thereto, and to ask for your active interference. To that end I had prepared a report for your meeting in October, but my efforts in that direction were thwarted by the waste of time upon a matter that was entirely irrelevant. An appeal to the chairman, though supported by the signatures of the majority of this board for a special meeting met with a flat refusal. I had hoped to effect an arrangement whereby the visit of the Dominion Government officer could be utilized for the benefit of the milk consumers, and that he should be accompanied on his rounds by some members of this board. Having failed, as above stated, I throw the responsibility for the miscarriage upon your chairman, and ask you to lay the report referred to before the council.

On the 29th of August I submitted to the council a report upon the examination of sixty-eight samples of milk collected by the sanitary inspector, from the milk vendors ; and, as it was referred to the finance committee for consideration, I prepared a special report upon the inspections that had been made up to date, in order that the whole question might be considered intelligently and with the view to remedying, as far as possible, the evils that had been permitted to grow up. At the request of that committee I examined twenty-four more samples—collected from some of the vendors previously visited, and eight samples from vendors who had been overlooked on the first rounds. I also collected twenty-four samples—some of them skimmed for my examination from parties who kept cows for private use only. This latter step was taken because the milk vendors claimed that the pasturage was responsible for the condition of the milk they had offered for sale, and proved very serviceable in estimating the situation properly. Upon these last samples I also reported and elaborated my former deductions.

As these several reports traverse the field pretty thoroughly, I have asked the finance committee to recommend to the council that they be referred to your committee on “food, meat and milk supply.”

In this connection I would draw your attention to the report of Dr. Griffin, M. H. O. for Brantford, in which he states that by vigilance and perseverance, the average of butter fat in the samples examinee by him had reached 4.53 per cent. ; while, notwithstanding the repetition of examination by your milk inspectors, the average this year is only 3.45 per cent. in the sixty-eight samples examined.

I wish to put on record the very satisfactory manner in which the board of education met the wishes of the Provincial Board of Health as regards exacting the certificates of successful vaccination from each and every pupil ; and I am more than pleased to know that this exaction is to be continued in the future, for it will, in a few years, secure for thousands of our people a protection against smallpox that will obviate the necessity for proclaiming “public vaccination.”

About 200 children have been successfully vaccinated in connection with my arrangement with the Sisters of the Hotel Dieu, and the results have been, on the whole, satisfactory and in strong contrast with those that obtained in connection with the vaccinating of the school children in 1894. I estimate that fully one thousand vaccinations have been made among school children on this occasion. This, together with the 1,200 vaccinated in 1894, places our school population on fairly satisfactory footing from this standpoint.

I find that by-law No. 877, “Public Health,” does not contain a clause providing for the inspection of our ice supply, nor for defining and regulating the source from whence that supply shall be obtained. This is a very serious oversight, and should be at once remedied in order that this season's cutting may be supervised and put beyond a doubt as to its purity.

I learn from conversation with the physicians of this city that the use of antitoxin is becoming general, and now that a reliable article can be obtained on very short notice, no hesitation occurs in administering it.

The statutes provided for the inspection of the school houses and their environment by the M. H. O., when so requested by the Board of Health. I presume that their condition is satisfactory to this board, as I have not been asked to do duty in this respect.

So far as I can learn this Board has had no report from any source as to the condition of our water supply and has not taken any steps to that end. I cannot understand how this very important matter has been overlooked by your committee on "plumbing, sewerage and water supply." In Toronto and elsewhere the M. H. O. is authorized by the council to have the necessary examinations made from time to time. Taking advantage of Mr. Kidd's visit here, and the nature of the instructions from the Dominion Analyst, I asked him to send a sample to Ottawa, and I expect to have a report thereon in my own hands shortly.

The diphtheria regulations, though adopted by order-in-council on Dec. 23rd, 1891, have not, as yet, been put into force in this municipality, and though By-law No. 877, passed was subsequent to their promulgation, does not provide for their being complied with in some very important respects.

I would have brought this matter to your notice before, but I was told in March last, by resolution of this Board to reserve all such matters for my annual report in December. I must insist on a change being made in this respect, or I shall be compelled to report, as provided for in clause No. 2 of these regulations to the Provincial Board, "default on the part of the authorities."

In these regulations the M. H. O. is enjoined to do certain things that I find it impossible to comply therewith on account of the manner in which the business of this Board is conducted under By-law No. 877.

The Provincial Board of Health for instance has provided for the examination, microscopically, of the sputa and portions of false membrane expectorated by any suspected case of diphtheria so as to facilitate an early diagnosis, but, so far as I have learned this golden opportunity has not been utilized by any officer of this Board, nor is it likely to be under existing conditions.

I notice that the Provincial Board of Health at its last meeting debated, at considerable length, the necessity of adopting some system of examining the school-children daily and following up any case of suspected contagious disease in order to prevent the spread of such diseases among the children. The outcome of the debate was the passing of a resolution recommending daily visits by physicians who should trace all suspected cases, if possible, to their origin.

It has frequently been demonstrated beyond a doubt that, to the mingling of the affected children among the unaffected has been largely due the very rapid and extended spread of one or other of the contagious diseases, and, doubtless, in time, some means will be found to cover the field efficiently.

I have notified all the medical practitioners in the city of the resolution passed in '93 or '94 requesting the notification to this Board of cases of typhoid fever, as I found it was not being done.

The experience of the year points to the desirability of the M. H. O. having some sort of supervision over the use of the city ambulance.

I would suggest that forms for reporting to this Board all cases of suspected contagious diseases coming to the knowledge of any public school teacher, be furnished to each Principal for such purpose. In this way cases that are not being attended by any physician will become known to this Board officially.

In conclusion let me draw your attention to the provision in clause 16, By-law No. 877, with regard to the abolishment of the privy vault or pit along the lines of the sewered streets next year, with the view to suggesting that preparations be made to inaugurate the campaign with the beginning of the new year (1900).

All of which is respectfully submitted.

R. CARNEY, M. H. O.

REPORT OF THE SECRETARY.

WINDSOR, December 1st, 1898.

To the Chairman and Members of the Board of Health :

GENTLEMEN,—Pursuant to the provisions of section eleven of the Public Health By-law, I have the honor to submit for your consideration the following annual report upon the "Sanitary Work" done during the year, as well as upon the "Sanitary condition of the Municipality."

Sanitary Work.—The annual cleaning of yards, alleys, etc., and the removal of the rubbish and other accumulations therein during the winter months, was perhaps more thorough this than in any previous year, the work of gathering and carting the same to the dumping ground having been effected not by day work as hitherto, but by means of a contract with Robert Briody, whose undertaking required him to continue at the job from the beginning of March until the 24th May, the price being \$250. The Inspector superintended the work constantly and was well satisfied with the manner in which Mr. Briody observed his obligations.

A more suitable dumping ground than the old one was secured from Mr. Briody at an annual rental of \$40, the location being remote from residences and of easy access. Six hundred and twenty-five closets in outlying parts of the city have been cleaned out at an average cost to the parties of \$1.25 each.

The plumbing by-law has been very generally enforced, and all new work as well as alterations and repairs, have been done under the supervision of and tested by the inspector. Thirteen new and forty old houses have been properly equipped and connected with sewers, and there have been eighty-four cases of drain and plumbing improvement and new plumbing effected—in all 137 cases in which the provisions of the by-law have been complied with.

On the application of owners, who have met the expense of the materials, eight stores and dwellings have been disinfected by the inspector.

The inspector has successfully prosecuted in the Police Court one offender for selling lump-jaw beef, one for selling decayed fruit, and three for maintaining nuisances upon their premises—namely, pig pens in two cases, and old bones and rags in the other. The officer also had destroyed as unfit for food a tierce of pork, a quantity of fish and of chickens.

Milk Inspection.—On August 3rd, no milk inspection having been made up to that date, the board requested the medical health officer to undertake that work at a time to be indicated by the chairman. Accordingly the inspector obtained for the purpose ninety-three samples from resident and non-resident dealers, some of which were taken on the 8th, 16th, 20th and 23rd days of said month. These were examined by the medical health officer, who reported thereon to the council in conformity with the provisions of the milk by-law, instead of to the board, as all previous medical health officers had done, with the result that the board has no knowledge of the nature of his investigation. The by-law, it is respectfully submitted, should be changed so as to require the report to be made to the board.

Contagious Diseases.—Contagious diseases have happily very largely given this city the go-by. Since the 15th December, 1897, there have occurred six cases of diphtheria, two of scarlet fever, two of typhoid and one of smallpox, in all eleven cases. One of the typhoid cases, that of a patient brought here from Michigan for treatment, proved fatal—the only death from any of the diseases mentioned during the year ending the 15th instant. The case of smallpox cost the board a good deal of money, to say nothing of the trouble entailed, and much advertising through foreign newspapers caused by the visitation, which, evidently for the purpose of attracting greater attention, was glibly referred to as an "invasion" of the dreaded disease. It was the case of a tramp, who variously gave his name as George Irving and Edward Maloney. He was locked up in the cells on the 5th February, and the same night was visited by the city physician, prescribed for, and the following day sent to Hotel Dieu, where the nature of his ailment was recognized and his removal from that institution back to the cells ordered by the Sister Superior. The then medical health officer was summoned, and he had the patient taken to the contagious disease hospital the same night. Thomas Davis, an old smallpox nurse, was placed in charge. On the 19th February the secretary of the Provincial Board of Health met the local board by appointment to ascertain the facts in regard to the case, after learning which he approved of the course pursued by the board and instructed the present medical health officer to keep a sharp look out for a person who spent a night in a cell adjoining the one occupied by the patient and who had been released and was at large, and vaccinate him as soon as found—all the other persons in any way brought into contact with him having been protected against contagion. Dr. Bryce also advised that the patient be detained ten days longer in the hospital, which advice was adopted. Nothing has since been heard of the man.

Vaccination.—The question of the general vaccination of the pupils attending the public schools of the city having been raised, a special meeting of the board was held on the 19th of August for the purpose of taking action upon that question. The chairman of the Board of Education was present by invitation. It was decided that in order not to interfere with school work, all the pupils requiring it should be vaccinated forthwith; the board instructed the medical health officer to telegraph for vaccine, appointed a physician to attend to each school house to examine and when found necessary vaccinate the pupils on the roll of such school, fixing the price of the work at 25 cents each pupil; ordered notices to be prepared and delivered at every house in the city, setting out the action and object of the board and affording all needful directions to parents and children; directed the medical health officer to supply the physicians appointed as aforesaid with the necessary vaccine points; authorized the chairman with the medical health officer to fix the precise date upon which the children were to attend at the school houses for examination, etc., and the chairman to supply record books for the use of the physicians, and also requested the medical health officer to prepare a form of certificate to be furnished the pupils for presentation to the teachers on the reassembling of the schools. The vaccine points, however, arrived so late, and some other difficulties arising in the interval, that it was found impossible to carry out the intention of the board; the points were returned unopened, and a warrant issued to the medical health officer for \$12.50 to be remitted for damage done to the points by their double journey from and to Quebec. Later on the Board of Education took the matter up and required all children attending school to produce by a fixed date (November 1st) to their teachers a certificate of successful vaccination. As some parents were confessedly unable to stand the expense of vaccination under the rule of the Board of Education, the Board of Health resolved on October 5th to furnish free vaccination to all poor persons and authorized the medical health officer to vaccinate all who should apply to him with a certificate from the president of the Home of the Friendless of their inability to pay, which certificate was deemed a necessary precaution against imposition. The result of these several steps to ensure protection from contagion for the youth of the municipality, will no doubt be communicated to you by the officer responsible for carrying them out.

The Hospital.—The contagious disease hospital is in as good a condition as a building of that description could well be. Everything necessary for comfortable occupation of patients has been provided and made ready for use. Fuel has been placed under cover, the heating apparatus increased so that two wards can be heated in fifteen minutes without waiting for the slower action of the large furnace, and come what may in the form of smallpox or other similarly dreaded maladies, the board is in a position to treat patients in a prompt, humane, and satisfactory manner.

Perhaps the most important duty the board next year will be called upon to face will be the securing of a new and if possible a more convenient site to which the hospital may be removed, as the existing lease will expire before the end of that year. This fact the overhiding members will do well to keep in mind.

Sanitary Condition of the City.—It is perfectly safe to say that never before in its history has the sanitary condition of the place been as good as at present; and it is as certain that this satisfactory condition of things has been brought about by the persistency of the board in enforcing those by-laws designed to compel obedience to well-established ideas. People generally naturally shrink from expenses the immediate benefit of which they do not perceive. For example, house-owners generally will hesitate to provide effective plumbing and drainage for the premises they rent, and tenants are equally indifferent as to the cleanliness of their holdings, unless some authority backed by the strong arm of the law exercise watchfulness and interpose its power to effect proper conduct on the part of both these classes. So also in respect to isolation of persons afflicted with contagious and infectious diseases—if no restraining influence be exercised from without, people generally will utterly disregard danger and freely place themselves and the public in jeopardy. It sometimes, no doubt, appears like undue severity to compel a rigid observance of preventive measures; but in no other way can the health and security of the community as a whole be subserved; and the marked improvement in Windsor's condition, despite the lamentable state of the decayed wooden pavements on several of the most used streets, is directly and emphatically a tribute to the fidelity to its duties observed by the Board of Health the past few years.

Appended hereto is a table showing the deaths registered since December 15, 1897, to the date of this report and the causes thereof (with the ages of the victims) reported by the physician attending in each case.

I have the honor to be, gentlemen,

Your obedient servant,

STEPHEN LUSTED,

Secretary.

TOWNSHIPS.

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Armour	Wm. Crawford, M.D.; Alex. Mackie.	.....	Typhoid, 2 cases; tuberculosis, 1 case.
Alfred.....	A. A. Gibault, M.D.; Joseph Brisebois.	When complaint is made to the Board.	Typhoid, 8 cases.....
Ashfield.....	F. M. McLennan, M.D.; Wm. Stothers.	No	Scarlatina, 2 cases; typhoid, 2 cases.
Alnwick.....	T. C. Lapp, M.D.; James Roberts.	Action taken only when complaint is made.	Diphtheria, 9 cases.....
Adelaide	F. J. Bateman, M.D.; H. J. Miller.	General, when the Board considers it necessary.	Scarlatina, about 30 cases
Athol	J. M. Platt, M.D.; Wm Moore.	No	Diphtheria, 13 cases.....
Ameliasburg.....	Drs. Thornton, File and Farncomb, M.H.O.'s; James Benson.	Yes; only when complaint is made.	Diphtheria, 2 cases; tuberculosis, 5 cases.
Anderdon	James Parke, M.D.; A. C. Maillaux.	Only when complaint of nuisance is made to Board.	Scarlatina, 2 cases; diphtheria, 3 cases, 1 death; typhoid, 1 case.
Arran	T. F. McNally, M.D.; Jas. M. Monckman.	General sanitary inspection twice a year, and member of Board visits schools once a year.	Typhoid, 1 case; tuberculosis, 2 cases.
Algona, S.....	—, Galligan, M.D.; T. McGreath.	No; no; yes	None.....
Arthur.....	A. J. Reynolds, M.D.; Geo. Cushing.	Yes; and special when complaint is made.	Scarlatina, 2 cases; diphtheria, 3 cases, 1 death; typhoid, 6 cases; tuberculosis, 1 case, 1 death.
Augusta	W. H. Waddell, M.D.; J. W. Place.	No; no; action taken only when complaint is made to Board.	Diphtheria, 8 cases.....
Anson & Hindon.....	C. D. Curry, M.D.; T. H. Rodgers.	Only when complaint is made to Board.	Scarlatina, 5 cases.....
Ancaster	G. D. Farmer, M.D.; Henry Pim.	Annual inspection of Village, of drains and cheese factories.	Scarlatina, 1 death; diphtheria, 6 cases; typhoid, 1 death; tuberculosis, 2 death.

TOWNSHIPS.

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes	Yes	Yes	No
Private isolation. No....	Yes	Yes	No; no.....
No	No cases	Sometimes	No.....
Isolated at homes; no hospital.	Yes; recently; extremely satisfactory.	Yes	No.....
Yes; no hospital.....	Yes	Yes	No; No.....
Yes.....	Think it is	Yes	No.....
As far as possible by isolation on premises.	Dr. Thornton, Consecon, has used it successfully in his practice.	Yes	Only when complaint is made; no.
Yes; house placarded	No	By attending physician..	No..
Isolated and quarantined; no hospital.	No	Yes	Yes; no.....
Yes	Yes; no occasion to use it this year.	Yes	No; no.....
Yes; confined to one apartment of house and premises placarded.	No	The physicians in attendance have the supervision	Yes; no
Yes; when notified by physician.	No	M. H. O. disinfects, but in only one instance has the M. H. O. been notified by attending physicians.	No; no.....
Yes; no isolation hospital.	No diphtheria in 1898; antitoxine used in previous years with success.	Yes	No.....
As far as possible; no isolation hospital.	Used in all cases by M. H. O. with satisfactory results.	Under supervision of M. H. O.	No.....

TOWNSHIPS.—*Continued*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Armour	No	Wells, about 20 feet	No
Alfred	No	Wells, 12 feet	No; none
Ashfield	No	Wells	No
Alnwick	No	Wells, about 20 feet	No; no
Adelaide	No	Wells	No dairy
Athol	No	Wells	No; no
Ameliasburg	No	Wells	Systematic inspection of cheese and butter factories only.
Anderdon	No	Wells, from 30 to 60 feet	No
Arran	Yes	Wells, from 10 to 40 feet deep.	No dairies in municipality; none
Algona, S.	Yes	Wells, about 12 feet	No; no
Arthur	Yes	Wells, from 15 to 25 feet deep.	No; no
Augusta	No	Wells, 10 to 15 feet	No; none; lately; no ..
Anson & Hindon	No	Usually from springs	No
Ancaster .....	.....	Wells, 14 to 55 feet	Yes; no test

TOWNSHIPS.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
2; not licensed; offal fed to hogs.	No.....	No.....	None.....	No.
2; no; buried when required.	No.....	No.....	None.....	No.
2; licensed; offal fed to hogs; no systematic inspection.	No.....	No.....	None.....	No.
1; used but once a week; offal boiled and fed to hogs.	Each family disposes of their own.	No.....	None.....	No.
2.....	.....	No.....	None.....	No.
No.....	No.....	No.....	None.....	No.
.....	.....	.....	.....	No.
None.....	No.....	No.....	None.....	No.
2; not licensed; offal is boiled and fed to hogs; no systematic inspection of carcasses.	.....	No.....	2; slaughter houses not licensed, but inspected.	No.
None.....	No.....	No.....	None.....	No.
One; yes; no inspection of carcasses; meat is sold in the adjoining village.	No; trustees of schools are required to keep water closets in a sanitary condition.	No.....	None.....	No.
No.....	No.....	.....	.....	No.
One; not licensed; no inspection.	No.....	No.....	None.....	No.
1; no licenses.....	No.....	No.....	.....	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Amabel.	T. Campbell, M.D.; R. Murray.	General sanitary inspection; township divided into divisions, with sanitary inspector for each district.	Diphtheria, 4 cases, 1 death; typhoid, 5 cases, 1 death; tuberculosis, 7 cases, 2 deaths.
Albermarle.	— Wigle, M.D.; C. E. Wincher.	Action taken when complaint is made.	.....
Assignack. ....	.....	General inspection at intervals.	None.
Alice & Fraser.	G. E. Josephs, M.D.; J. M. Kennedy.	Only when complaint is made.	Diphtheria, 3 cases, 3 deaths; tuberculosis, 1 case, 1 death.
Amherst Island.	None.	No; no; when called upon.	Tuberculosis, 2 cases
Artemesia.	J. G. Hutton, M.D.; W. J. Bellamy.	No; action taken on notice.	None reported.
Adjala.	— Wright, M.D.; P. J. Haffey.	No; no action, only on complaint.	None.
Alberton.	R. Moore, M.D.; J. D. Stewart.	When complaint is made to Board.	Tuberculosis, 1 case, 1 death.
Burges, N.	No M.H.O.; P. McFarland.	No.	None.
Bexley.	J. Grant, M.D.; Alfred Tayor.	Action is taken when complaint is made to Board.	Diphtheria, 1 case; typhoid, 1 case.
Burford.	R. Harbottle, M. D.; Philip Kelly.	No; only upon complaint.	Scarlatina, 7 cases; typhoid, 2 cases, 2 deaths; tuberculosis, 2 cases, 2 deaths.
Bastard & Burgess, S.	John G. Creegan, M.D.; Walter Beatty.	No; no; yes.	Typhoid, 1 case; tuberculosis, 1 case, 1 death.
Bedford.	— Parker, M.D.; James McNeil.	Yes; no; action taken when complaints are made.	Tuberculosis, 1 case, 1 death.
Brock.	McDermott & Jardine, M.D.'s.	.....	Scarlatina, 50 cases; diphtheria, 3 cases; tuberculosis, 3 cases.

TOWNSHIPS.—Continued.

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
es; no isolation hospital; by means of empty and isolated building.	Yes; when used early results have been good.	Yes	Yes; no
artially carried out; no hospital.	Yes	It would be if necessary.	No
o; no hospital	No	Yes	No; no
ouse and family isolated and disinfectants supplied.	Yes; good	Yes	No
o; no	No occasion to use it.....	Don't know	No; no
o	No	Yes	No
o cases			No
o			No
es; by isolation of house and compartments of patient.	Yes; Dr. Grant reports results most satisfactory.	No; but is under the direction of M. H. O.	No
es		No	No; no
o; no hospital	No	No	No; no
es; isolated at their homes; no hospital.	No	Yes	No
es; houses placarded and inmates not allowed to mingle with others for a month; no isolation hospital.	Yes; all cases recovered under its use.	Yes	Yes

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Amabel.....	Yes	Wells, average 12 feet...	No; no
Albermarle.....	.....	Mostly spring and lake water.	No
Assignack	No	Wells, 12 feet.....	No.....
Alice & Fraser.....	.....	Wells and springs, 40 feet deep.	No.....
Amherst Island.....	No	Bay water and wells ...	No; no
Artimesia	Yes	Wells, from 15 to 60 feet.	No.....
Adjala	No.....	Wells, usually 25 feet deep.	No; no; no.....
Alberton	No.....	Rainy River.....	.....
Burges, N.....	.....	Wells, 20 feet.....	No.....
Beseley	No.....	Wells, 12 to 50 feet	No; no
Burford	No.....	Wells and springs.....	No; yes.....
Bastard & Burgess, S.....	.....	Wells, from 8 to 36 feet..	No; yes; the tuberculin test has not been used.
Bedford	No	Wells	No tuberculosis in township; no test.
Brook	Yes	Wells, 24 to 40 feet	No; yes; yes

TOWNSHIPS.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage, and if not, how is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what portion of houses to which is connected with public sewers?	State No. and kind of noxious trades. (See sec. 68, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
; no; offal supposed to be buried; no.	No.....	No.	None.....	No.
one	No.....	No.....	None.....	No.
; none licensed....	None.....	No.....	None.....	No.
one.....	No.....	No.....	None.....	
ne; not licensed'..	No.....	No.....	.....	No.
ne; no; don't know.	No.....	No.....	None.....	No.
one.....	No.....	No.....	None.....	No.
one.....		No.....	None.....	No.
one.....	No.....	No.....	None.....	No.
one.....	No.....	No.....	None.....	No.
Don't know; not licensed; fed to hogs.	No.....	No.....	None.....	No.
one; no	No.....	No.....	None.....	No.
one.....	No.....	No.....	None.....	No.
; yes; buried; no.	No.....	No.....	None.....	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Belmont & M.	W. J. Jeff, M.D.; Porter Preston.	No inspection; action taken only when complaint is made to Board.	Tuberculosis, 3 cases.
Bosanquet.	H. S. Clerke, M.D.; Geo. Sutherland.		Scarlatina, 5 families; typhoid, 2 cases; tuberculosis, 2 cases.
Bayham.	A. B. Riddell, M.D.; J. G. Pauling.	Action taken only when complaint is made.	Scarlatina, many cases; diphtheria, 3 cases, 1 death; typhoid, 1 case, 1 death; tuberculosis, 1 case, 1 death.
Blenheim.	J. A. Mitchell, M.D.; W. F. Ainslie.	School houses and slaughter houses are inspected and action taken when complaints are made.	Scarlatina, 28 cases, 1 death; diphtheria, 12 cases; typhoid, 1 case.
Brant.	A. B. Taylor, M.D.; J. H. Cannon.	Yes; one annually, and also when complaint is made.	Scarlatina, 3 cases; diphtheria, 3 cases, 1 death; tuberculosis, 4 cases, 4 deaths.
Brantford.	C. D. Chaplin, M.D.; Robt. M. Wilson.	Action taken only when complaint of nuisance is made.	Scarlatina, 2 cases; tuberculosis, 2 cases, 2 deaths.
Bathurst.	No M.H.O.; P. McKinley.	Yes; yes.	Diphtheria, 3 cases.
Blanshard.	A. K. Ferguson, M.D.; J. H. Jameson.	Yes; yearly.	Scarlatina, 18 cases; typhoid, 7 cases, 1 death; tuberculosis, 1 case, 1 death.
Brighton.	N. B. H. Dean, M.D.; D. Crouter.	No general inspection; under supervision of sanitary inspector.	Diphtheria, 2 cases, 2 deaths; typhoid, 1 case, 1 death.
Bertie.	N. Brewster, M.D.; A. H. Kilman.	Annual inspection ordered in May; action on complaint thereafter.	Diphtheria, 6 cases, 2 deaths; typhoid, 17 cases, 1 death; tuberculosis, 2 cases, 1 death.
Brooke.	A. Mackinnon, M.D.; W. G. Willoughby.	Cheese factories are inspected usually; other inspections when complaint is made.	Scarlatina, 1 case, 1 death; tuberculosis, 2 cases, 2 deaths.

TOWNSHIPS.—Continued

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
No	Not in common use; good results when used.	No	No
Yes	No	Generally by attending physician.	No; no.....
Houses placarded; household isolation; no hospital.	Yes; with favorable results.	No	No.....
As far as possible; no isolation hospital; places placarded.	Yes; antitoxine used successfully in 4 of the 5 cases mentioned.	Yes; in almost every case.	Yes; nothing has been done towards vaccination for several years by the Board.
Isolated in the homes; no hospital.	No	Attending physician or M. H. O. notify Sanitary Inspector, who disinfects and removes placard.	No....
No isolation hospital; patients isolated as far as possible in their homes.	Antitoxine has been very frequently used; results seem quite satisfactory, but the number of cases does not admit of a definite conclusion.	Disinfecting generally left to attending physician, but more or less observation is kept on the cases by the Medical Health Officer.	No.....
Yes; houses placarded and wants of inmates attended to; no hospital.	Yes; no deaths occurred ..	Yes	No.....
Yes; houses placarded....	Yes	Yes	Yes; no.....
No occasion for isolation hospital.	.....	Under direction of physician in attendance or M. H. O.	.....
Placards used; isolation of family; no hospital.	Antitoxine has been used with some apparent success by physician in charge, but not used by board.	Yes; under M. H. O....	No; no.....
To some extent .....	.....	Yes	No; no.....

TOWNSHIPS — *Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Belmont & M.	No	Don't know	No inspection: no cases of tuberculosis.
Bosanquet	No		
Bayham	No	Wells, 12 to 30 feet	No; no cases of tuberculosis reported or known
Blenheim	Yes; to medical men	Wells, from 15 to 40 feet.	No; no cases reported ..
Brant	Forms are supplied physicians practicing in municipality.	Wells and springs	One inspection of dairy cows held during the year no case of tuberculosis,
Brautford	No	Wells, average depth about 25 feet.	No
Bathurst	No	Various	No
Blanshard	Yes	Wells, from 20 to 40 feet.	No
Brighton		Mostly wells	No
Bertie	Physicians only	Wells, varying 18 feet in soil to 50 feet in rock.	No; no
Brooke	Supplied, but not used ..	Generally by wells	No; no tuberculin test has been used.

TOWNSHIPS.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades (See sec 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
Don't know of any..	No.....	No.....	None.....	No.
One.....				No.
3; no; offal buried; no.	No system.....	No.....	None.....	No.
4; no license; usually fed to pigs; no; 4.	No.....	No.....	None.....	No.
10; licensed; when favorably reported by sanitary inspector: boiled or buried; carcasses not inspected.	No.....	No.....	Slaughter houses....	No.
9; not licensed; don't know; offal is disposed of; no inspection of carcasses.	No.....	No.....	9; slaughtering of animals.	No.
Two.....	No.....	No.....	Slaughtering of animals.	
None.....	No.....	No.....	None.	
3; not licensed; offal generally fed to hogs.	Not generally.....	No.....	None.....	No.
5 or 6 farm butchers; they are ordered to bury or burn the offal; no systematic inspection.	No.....	No.....	None.....	None.
Two; no; buried; no.	No.....	No.....		No.

TOWNSHIPS.—*Continued*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Bonfield.....	—Berute, M.D.; Thomas Cahill.	Only when complaint is made to Board.	Scarlatina, 10 cases diphtheria, 2 cases tuberculosis, 1 case.
Burleigh & A.....	A. R. Caldwell, M.D.; P. W. C. Shewen.	Inspection was partially made in spring of '98, and when deemed necessary.	
Brougham.....	R. G. Conolly, M.D.; M. Sheedy.	No; no; when complaint is made.	Diphtheria, 3 cases, 1 death.
Beverly.....	J. T. Manes, M.D.; W. McDonald.	No; no; action taken when complaint is made	Diphtheria, 9 cases; typhoid, 6 cases.
Bentinck.....	No M.H.O.; D. Campbell.	General inspection in the spring, and at intervals when complaints are made.	Scarlatina, in 3 families, 2 deaths; diphtheria, in 2 families; tuberculosis, 8 cases reported.
Burpee.....	T. Johnston, M.D.; Isaac Campbell.	When complaint is made.	
Barton.....	No M.H.O.; H. Bryant	When complaint is made to Board; also at intervals.	
Blandford.....	Drs. West & Dewar; R. J. Henderson.	Action taken only on complaint.	Tuberculosis, 1 death....
Brunel.....	J. W. Hart, M.D.; H. Farnsworth.	Only when complaint is made.	Diphtheria, 8 cases, 1 death.
Bromley.....	A. J. Sparling, M.D.; Patrick Hart.	No; only when complaint is made.	Diphtheria, 4 cases; tuberculosis, 3 cases.
Cardiff.....	Robt. Caldwell, M. D.; A. W. Willis.	When complaint is made to Board.	Diphtheria, 10 cases, 1 death.
Cumberland.....	Jas. Ferguson, M.D.; W. W. Dunning.	Action taken only when complaint is made.	Scarlatina, 20; diphtheria, 5 cases, 1 death; typhoid, 10 cases; tuberculosis, 4 deaths.
Crosby, South.....	D. A. Coon, M.D.; J. R. Dargavel.	No.....	
Charlottenburgh.....	A. Falkner, M.D.; G. H. McGillivrey.	Yes, of cheese factories and slaughter houses, and in other cases; action taken on complaint.	Diphtheria, 20 cases; typhoid, 5 cases, 2 deaths, tuberculosis, 11 deaths.

TOWNSHIPS—*Continued*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
.....	.....	Yes .....	.....
Yes; house isolation; no hospital.	No	Yes	No
Yes: no isolation hospital.	Yes	Yes	No; no
Yes; as nearly as possible; no isolation hospital; free use of disinfectants.	Yes; has been satisfactory; two deaths have occurred during the year after its use.	Generally so; always so, if necessary.	No; no
Yes; on premises	No physicians report, and cannot give results.	Under supervision of attending physician.	No
No hospital	No	No occasion	No
Having no contagious diseases, no method was adopted.	No occasion	No occasion	No
No; under supervision of attending physician.	Yes; but not used this year.	No	No
Yes; isolated in their own homes.	Yes; all cases treated with antitoxin recovered; one patient not so treated died.	Yes	No
Yes; houses placarded; communication cut off.	Yes; results very satisfactory.	Not in all cases	No; no
Yes; generally	Yes; successfully	Yes	No
Yes: no hospital	Yes; very best results follow its use; in early stage it is a specific.	Yes, by M.H.O	No
No hospital	Don't know	No necessity	No; no
Yes; in separate rooms; no.	Yes; very satisfactory	Yes	No; no

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Bonfield	None		
Burleigh & A.	No	Wells	No no
Brougham	None	Running springs	No; no
Beverly	Yes	Usually from rock-drilled wells, from 20 to 40 feet.	No; no
Bentinck	No	Wells	No.
Burpee	Yes	Wells, 5 feet	No
Barton	Not yet		No cases of tuberculosis; cow byres are inspected
Blandford	Yes	From wells	No; no; no
Brunel	No	Spring water	No
Bromley	No	Generally from wells, 12 feet.	No; no; not used
Cardiff	No	Wells	No
Cumberland	No	Wells; about 15 feet	No tuberculosis has occurred.
Crosby, South	No	Wells; from 10 to 30 feet	No; no
Charlottenburgh	Yes; to physicians	Wells; about 10 feet	No

TOWNSHIPS — *Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage, and ought it? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
One; not licensed				
None; no	Removal by owner of property at his own cost.	No	None	No.
None.	No	No	None	No.
Four; 10; fed to pigs.	No	No	None	No.
One; no license; inspected by sanitary inspector.	No	No	None	No.
13; not licensed	Used on land	No	None	No.
4; no			None	No.
One; no; no special disposition is made	No	No	No	No.
None	Householders remove night soil and garbage.	No	None	No.
Two; not licensed; put on land; no inspection of carcasses by any officer.	None	None	None	No.
No licensed slaughter houses.	No	No	None	No.
Three; yes; buried; no, unless complaint is made.	Well looked after by householders.	No	None	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board.	Contagious diseases.
Collingwood	John Shultis, M.D.; Ed. Rorke.	Yes, once a year.	
Carrick	J. A. Wilson, M. B.; James Johnston.	Yes; repeated every year.	Typhoid, 3 cases, 1 death; tuberculosis, 1 case, 1 death.
Cambridge	W. E. Crain, M.D.; J. B. Sanche.	Only when complaint of nuisance is made to Board.	Diphtheria, 5 cases
Cockburn Island.	No M.H.O.; A. Monck.	Only when complaint is made.	
Clarence	N. DesKosies, M.D.; Joseph Minard.	Repeated every year; in spring and when complaint is made.	Scarlatina, 2 cases; diphtheria, 19 cases; typhoid, 23 cases, 8 deaths; tuberculosis, 4 cases, 2 deaths.
Chaffey	F. L. Howland, M.D.; W. Clarke.	Only on complaint.	None
Charlotteville	W. J. Innes, M.D.; John Machon.	Action taken only on complaint.	Tuberculosis, 2 cases.
Chapman.	J. S. Freeborn, M. D.; Joseph Wilson.		None.
Cavan	H. A. Turner, M. D.; Geo. Sootheran.	Only when complaint is made.	Tuberculosis, 2 cases, 2 deaths.
Cayuga, North	J. Baxter, M.D.; James Mitchell.	On complaint.	Diphtheria, 3 deaths; consumption, 4 deaths.
Cardwell	J. A. Morgan, M. D.; Mathew Wilson.	Action is taken on complaint.	Diphtheria, 3 cases.
Caldwell	No M.H.O.; O. Lafrance.	None.	None.
Carden	No M.H.O.; John Walsh	No	None.

TOWNSHIPS.—*Continued*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes; families are isolated in their homes, under the supervision of the M.H.O. No hospital.	Yes; results are very satisfactory.	Yes	Yes
Yes; carried out in private houses.	Think it is; M.H.O. has used it in every case with good results.	Yes	No; no
Yes; usual methods; no..	Yes; most satisfactory....	Yes	Yes; no; no.
No occasion .....	.....	.....	No; no
No	Yes; good results.....	No	No
Houses are isolated	Where used results were good.	Yes	No
Yes; no	Don't know	Yes	No
No occasion	No occasion	No occasion	Yes; no
Yes; isolated or sent to Peterboro' hospital.	Yes	Yes	No; no
.....	Yes	Yes	No
Yes; no hospital; isolated in their homes.	No	Yes	No; no
No hospital	No .....	.....	Yes, once or twice each year; no certificates required as yet.
Yes	No	Yes	No

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M.H.O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Collingwood.....	No.....	Wells; 10 to 30 feet....	No dairy cows....
Carrick	No.....	Wells; don't know depth	No; tuberculin test not used; do not know of any cases having occurred.
Cambridge	No.....	Wells; 12 to 15 feet	No; don't know.....
Cockburn Island.....	No.....	A creek	No.....
Clarence	No.....	Wells; about 12 feet....	No.....
Chaffey	No.....	Wells and springs.....	No; no
Charlotteville	No.....	Wells and streams.....	No.....
Chapman	No.....	Wells and springs ...	No; no
Caven ...	Yes	Principally from wells; about 20 feet.	No.....
Cayuga, North	Yes		No.....
Cardwell	Yes	Generally from springs..	No; no cows.....
Caldwell	Not except asked	Wells, 8 to 12 feet.....	None
Carden.....	No.....	Wells, from 12 to 20 feet.	No.....

TOWNSHIPS.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewage system? If so, what proportion of houses to who is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
Three under license; offal disposed of to the satisfaction of inspector; no inspection of carcasses.		No.	None	No.
17; no license but must have approval of Board and comply with requirements; offal generally burned; no inspection of carcasses.	No.	No.	None	No.
Two; no; don't know; no.	No.	No.		No.
None.		None		No.
Three; no license; burned.	No.	No.	No.	No.
Three; inspected.		No.		No.
Don't know how many, but all are inspected.	No.	No.	None.	No.
One.	Each resident removes night soil and garbage at his own expense.	No.	None.	No.
Two; no; boiled and fed to hogs.	No.	No.	No.	No.
One.				None.
One.	No.	No.	None.	No.
One.	No.	No.	None.	No.
One.	No.	No.	None.	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Caledon	Jas. Algie, M. D.; D. Kirkwood.	Action taken on all cases deemed necessary, either on receipt of complaint, report of physician, or when anything comes under the notice of any member of the Board. The sanitary inspector or M. H.O. according to the nature of the case takes action.	Scarlatina, 4 cases; diphtheria, 5 cases; typhoid, not reported; tuberculosis, not reported.
Crowland	S. H. Glasgow, M.D.; W. D. Misener.	Action taken only when complaint is made.	Scarlet fever, 1 case.....
Clarke	No M. H. O.; John Rickaby.	No; inspection by members of Board in districts allotted.	Scarlatina, 5 cases; diphtheria, 1 case.
Carlow	No M. H. O.; W. D. Parkhurst.	No; no; only on complaint.	None reported.....
Cartwright	No. M. H. O.; William Lucas.	General sanitary inspection repeated.	Typhoid, 1 case.....
Colborne	A. Taylor, M.D.; F. W. McDonagh.	No; no; yes.....	None
Canborough	C. J. Kelly, M.D.; N. R. Teeft.	Only when complaint is made to Board.	Tuberculosis. 1 case.....
Christie	No M. H. O.; Wells Thompson.	Action taken only when complaint is made.	None.....
Calvin	M. James, M.D.; W. T. Gale.	Action taken on complaint.	None.....
Colchester, North	J. E. Jenner, M.D.; A. C. Atkinson.	No general inspection; action only taken when complaint is made.	Diphtheria, 2 cases, 1 death; typhoid, 1 case, 1 death; tuberculosis, 2 cases, 2 deaths.
Carling	J. R. Stone, M.D.; James Crerar.	Action taken on complaint.	None.....
Caradoc	M. Bice, M.D.; C. H. Lockwood.	Yes; three times a year.	Scarlatina, 41 cases, 3 deaths; diphtheria, 3 cases; typhoid, 2 cases, 1 death; tuberculosis, 1 case, 1 death.

TOWNSHIPS.—Continued.

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic instruction of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes; isolation is carried out and sanitary policeman appointed where necessary; placarding the door, the exclusion of children from school, and family prevented from mingling with the public.	Not in common use; always keep a fresh supply on hand.	Yes; unless done and certified by attending physician.	No; no
No isolation hospital; patients kept in room and disinfectants used.	No	Carried out under attending physician's instructions.	The Board acts when called upon.
Isolated at houses; houses placarded; no.	No	Yes, by physicians in charge.	Yes, at least once a year
Yes, where necessary: no hospital.	No	No	No
Isolation systematically carried out by placarding the premises and notifying school teachers; no isolation hospital.	Physicians are supplied with anti-toxine.	Yes, by attending physician.	No; no
No	Yes, when required.	Don't think so.	No; no
	Yes		No; no
Houses are placarded.	Don't know	Yes	No; no
			No.
Placarding and quarantine of infected houses; no hospital.	Don't know	No.	No; no
			No; no
Yes; no isolation hospital; methods: placarding, quarantining, disinfecting.	Yes; the 3 cases of diphtheria were treated with anti-toxine.	Yes, by formaline lamp.	No; no

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M.H.O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Caledon	Yes, freely	Wells and springs	No; not that we know of.
Crowland	Don't know	Wells; generally about 25 feet.	Don't know
Clarke	To physicians only	Wells; water supply good	No; no
Carlow	No	Springs and wells; about 30 feet.	No; no
Cartwright	No	Wells; about 30 feet....	No; no cases of tuberculosis.
Colborne ..	No	Wells; 30 to 50 feet....	No, no
Canborough	No		No; no
Christie	No	Wells	No; no cases
Calvin	No		No
Colchester, North	No	Surface wells about 12 feet; bored wells, 150 feet.	No; no cases; tuberculin not used so far as I know.
Carling	No	Wells, from 2 to 12 feet.	No; no
Caradoc	Yes	Artesian wells, 15 to 20 feet.	Have no dairies in township; had no cases, sanitary inspector makes regular visits to cheese factories, etc.

TOWNSHIPS — *Continued*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is the cost calculated?	Is there a public sewage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, any results of same
Six; no license fee exacted; inspection made; offal buried; no inspection of carcasses.	No regular system; the Board issues notices every spring calling for the cleaning up of wells, privies, cellars and cess-pools; each household held responsible for the sanitary condition of his premises.	No.....	One tannery, kept in good condition.	No.
No regular slaughter houses.	Removed when necessary; buried generally.	No.....	None.....	No
Three; no; fed to hogs or buried; no.	Householders are responsible for removal.	No.....	None.....	No
None.....	No.....	No.....	None.....	No.
None.....	No.....	No.....	None.....	No.
None.....	None.....	.....	None.....	No.
Three; no; no. . .	.....	No.....	.....	No.
One	No.....	No.....	None	No.
None.....	.....	.....	None	No.
None.....	.....	.....	None	No.
.....	.....	.....	None	No.
Three; yes; burnt; no.	No.....	No.....	None	No.

TOWNSHIPS.—*Continued*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Chandos.....	Jno. Calwell, M.D.; J. W. Ratchiff.	Only when complaint is made.	None.....
Caistor	R. H. Delemater, M.D.; W. J. Warner.	Yes; action taken when complaints are made to Board.	Tuberculosis, 1 case, death.
Cramahe	R. W. Stinson, M.D.; R. B. Walt.	No; action taken when complaint is made to Board.	Typhoid, 1 death; tuberculosis, 1 death.
Carnarvon.....	None.	No.	None.....
Culross	— Gillies, M.D.; Chas. Button.	Inspection made at intervals.	Diphtheria, 1 case; typhoid, 2 cases, tuberculosis, 8 cases.
Day, Gladstone, etc.....	No M.H.O.; W. Harris.	No	None.....
Drummond.....	No. M.H.O.; Thos. B. Moore.	Only when complaint is made.	None.....
Dummer	J. W. Couch, M.D.; B. James, jun.	No; no; yes	Scarlatina, 3 cases; diphtheria, 2 cases; tuberculosis, 2 cases and 2 deaths.
Dungannon	A. S. Leavitt, M.D.; B. Spurr.	No.....	None.....
Dunn	G. A. MacCallum, M.D.; David Lyons, jun.	No; no	Diphtheria, 1 case.....
Dunnet and Rutter.....	H. Irwin, M.D.; J. T. Froysell	Yes	Typhoid, 4 cases, 1 death
Dysart	Wm. Gillies, M.D.; Wm. Prust.	Yes; when complaint of nuisance is made to Board.	None.
Dumfries, South.....	J. L. Addison, M.D.; Wm. Fleming.	Yes; twice and when complaint is made.	Scarlatina, 4 cases; typhoid, 3 cases, 1 death; tuberculosis, 2 cases, 2 deaths.
Denbigh, Abinger and Ashby	Chas. D. Doig, M.D.; Paul Stein.	.....	None.....
Dalhousie and N. Sherbrooke	A. Downing, M.D.; Walter Geddes.	No; no; only when complaint is made.	Tuberculosis, 2 cases, 2 deaths.

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? (Give results of treatment in all cases where possible.)	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
No isolation hospital exists; patients carefully guarded in their own homes.	It is.....	Yes	No.....
Yes, by placarding; no hospital exists.	Yes	No occasion	No; no
Yes; isolated in their own homes; no hospital.	Don't know; no cases existed.	No contagious diseases existed.	No; no
Yes	No.....	Yes	No.....
.....	.....	.....	No.....
.....	.....	.....	No Board
No; no hospital	Not in common use	Think not.....	No; no
Yes, placard	Yes; successful	Yes	No no
Yes, where required.....	Yes; good results	No.....	No.....
Yes, by attending physician.	Yes; good results	No; the physician in attendance looks after disinfection.	No; no
Yes	Yes	Yes	No.....
Yes	Not been used	Yes	No; no
Yes; all communication with family shut off; after recovery or death place disinfected before allowing communication.	No diphtheria	Not always	Yes; no.....
Not necessary	No diphtheria .....	.....	No.....
Houses placarded and patient isolated; no hospital.	Don't know.....	No; just under orders from M.H.O.....	No; no

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Chandos	No.....	From wells	None.....
Caistor.....	Yes	Artesian wells.....	No; no; no cases have been reported.
Cramahe	No.....	Don't know	No; no
Carnarvon.....	No.....	.....	No.....
Culross.....	No.....	Wells, from 20 to 60 feet	No.....
Day, Gladstone, etc.....	No.....	Schools generally have small wells.	No.....
Drummond.....	Yes	Wells, 36 feet deep in solid rock.	No inspection of dairy cows.
Dummer	Yes	Wells	No; no; no.....
Dungannon	No.....	Wells, 12 feet	No.....
Dunn	No.....	Wells, 12 to 24 feet.....	No.....
Dunnet and Rutter.....	No.....	Wells, 30 feet.....	No.....
Dysart	No.....	Wells and springs.....	No; no
Dumfries, South.....	Yes, to M.H.O. only....	Wells from 10 to 20 feet deep.	Yes; no.....
Denbigh, Abinger and Ashby	No..	Wells almost exclusively, 10 to 20 feet deep.	No....
Dalhousie and N. Sherbrooke	No.....	Springs and wells, about 15 feet deep.	No; no

TOWNSHIPS.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec 63, Public Health Act). How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, and results of same.
None	No systematic removal.	No.	None	No.
Seven; no; fed to hogs.	Yes, by householders	No.	None	No.
None	No, not necessary ..	No.	None	No.
None	No.	No.	None	No.
Five; used once or twice a week for farmers' use.	.....	.....	.....	.....
None	No. ....	.....	None	No.
One; no license; offal is fed to hogs.	No systematic removal of night soil; no cost.	No sewerage system.	None	No.
Two; yes; buried; no.	No.	No.	None	No.
None in municipality	No.	No.	None	No.
No.	No.	No.	None	No.
No.	Yes	No.	None	No.
None	No.	No.	None	No.
Four; yes; boiled; no.	No.	No.	None	No.
None.	Removed by householders.	No.	None	No.
None; no	No.	No.	None	No.

TOWNSHIPS.—Continued.

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Darlington	J. C. Mitchell, M.D.; H. Elliott, jun.	Yes; once each year and when complaint is made.	Scarlatina, 10 cases; diphtheria, 9 cases, 2 deaths.
Draper	No. H. M. O.; David Cairnes.		None.
Dalton	No. M.H.O.; A. Montgomery.		Typhoid, 1 case.
Dorchester, North.....	A. Graham, M.D; W. B. Lane.	Action taken when complaints are made to Board.	Scarlatina, 10 cases, 2 deaths; diphtheria, 1 case; typhoid, 6 cases, 1 death; tuberculosis, 3 cases, 2 deaths.
Douro.....	John R. Fraser, M.D.; Wm. O'Brien.	No; no; only when complaint is made.	Scarlatina, 11 cases, 1 death; typhoid, 1 case; tuberculosis, no record kept.
Delaware.....	T. H. Mitchell, M.D.; W. C. Harris.	Yes; in the village of Delaware; twice a year and action taken when complaint is made.	Diphtheria, 11 cases, 2 deaths; typhoid fever, 5 cases, no deaths.
Downie	J. J. Paul, M. D.; P. Smith.	No general inspection; action taken only when nuisance complained of, except cheese factories and piggeries, etc.	Scarlatina, 5 cases; diphtheria, 3 cases, 1 death; typhoid, 2 cases; tuberculosis, 2 cases, 2 deaths.
Egremont	T. J. Sneath, M. D.; David Allan.	Action taken only when complaint is made.	Diphtheria, 2 cases, 1 death; tuberculosis, 4 cases, 4 deaths.
Elmsley, S	Wm. Pratt, M.D.; John Rabb.	No; no; action taken on complaint.	None.
Ernestown.....	J. E. Masbee, M.D.; E. O. Clarke.	Yes; only on complaint or suspicion of filth.	Typhoid, 10 cases.
Edwardsburg	S. C. McLean, M.D.; A. Carmichael.	Action taken when complaint is made to board.	Diphtheria, 1 case; tuberculosis, 6 cases.

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes, as far as possible; by isolating in private rooms where possible, and such means as attending physician may devise.	No; used by one or two; results good when used early; in one case symptoms very favorable for a time, succumbed afterwards to heart failure; two other cases disclosed weakness of heart after its use.	No, not always.....	No; no
None required.....		Yes, when required.....	No.....
No.....	Yes	Yes	No.....
Yes; patients separated from all others; children kept from school; no hospital.	Yes; results generally favorable.	Yes	No; no
So far as possible in patients' own houses, which are placarded and disinfected.	No cases.....	Disinfection is carried out; but not exactly under personal supervision, but houses are inspected by M.H.O. before placard is removed.	No.....
Yes; quarantine the house; no hospital.	Yes; no deaths occur when used.	Yes	Yes; no, vaccination is being sadly neglected.
Patients isolated in homes, inmates quarantined, and an officer appointed to look after their wants.	I think it is in general use; cannot give results.	Yes, by M.H.O. who generally does the work with a formaldehyde generator.	Only once a year; no...
As well as circumstances will permit; houses placarded; no hospital.	Don't know	No; only by physicians in attendance.	No; no
No hospital	Yes	No diseases reported....	No; no
Yes; isolated in houses or Kingston hospital.	Yes; good	Usually	No; no
Yes, as far as possible; no hospital.	Yes; results good	No	No; no

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Darlington	No	Wells, 15 to 60 feet	No; no
Draper	No	Wells	No inspection of dairy cows.
Dalton .....	.....	Springs	No
Dorchester, North	Yes	Wells, 30 feet	No; no
Douro .....	.....	Wells, about 20 feet	No
Delaware	Yes	Wells, 15 to 20 feet	No
Downie	No	Wells, from 16 to 30 feet	No; no
Egremont	Physicians supplied only	Wells and springs	No
Elmsley, S	No	Wells and springs; 12 to 30 ft.	No; no
Ernestown	Yes	Wells; 20 ft	No; no; no
Edwardsburg	No	Wells	No inspection of dairy cows; no cases of tuberculosis.

TOWNSHIPS.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost regulated?	Is there a public sewerage system? If so, what portion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act). How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, and results of same.
Two; no; don't know; no	No.....	No.....	None	No.
None		No.....	None	No.
None	No.....	No.....	None	No.
Seven; no; cooked and fed to hogs; no.	No.....	No.....	None	No.
One; no; fed on premises to hogs; no.	No.....	No.....	None	No.
Two; kept in good sanitary condition; offal fed to hogs; no inspection of carcasses.	No.....	No.....	None	No.
One; yes; generally boiled and fed to hogs; no.	No.....	No.....	None	No.
None	By householder	No	None	No.
One; offal buried ..	No	No	None	No.
Five; visited by inspector; fed to pigs; no.	No	No	None	No.
Two; no license; no inspection of carcasses.	.....	No	None	No.

TOWNSHIPS.—Continued.

Name of Municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board.	Contagious diseases.
Elmsley, N	No M. H. O.; P. McKinley.	Only when complaints are made.	Scarlatina, 1 case; typhoid, 2 cases.
Elderslie	No M. H. O.; J. C. McIntyre.	Yes	Tuberculosis, 3 cases; 8 deaths.
Eastnor	J. G. Sloane, M. D.; Chas. W. W. Dalton.	Only on complaint	Tuberculosis, 1 case; 1 death.
Ekfrid	L. J. A. Hyttenranch, M.D.; H. McFarlane.	Action taken when complaints are made.	Scarlatina, 2 cases; diphtheria, 1 case; typhoid, 1 case.
Eldon	J. F. Ross, M.D.; John Jackson.	Action taken only when complaint of nuisance is made to Board.	Tuberculosis, 5 deaths ..
Easthope, S	R. Whiteman, M. D.; Valentine Stock.	No; no; action taken when complaint is made.	Scarlatina, 2 cases, 1 death; diphtheria, 2 in one family, 2 deaths; Tuberculoses, 6 cases, 6 deaths.
Elma	A. S. Langrill, M.D.; Thos. Fullarton.	When complaint is made.	Scarlatina, 60 cases, 6 deaths; typhoid, 3 cases; tuberculosis, 4 deaths.
Ennismore	No M. H. O.; J. F. Collins.	Action taken only upon complaint of nuisance.	Typhoid, 2 cases; tuberculosis, 3 deaths.
Derby.....	C. E. Barnhart, M.D.; William Beaton.	Yes; once a year and when complaint is made of any nuisance.	Diphtheria, 1 case
Dumfries, N.....	Adam Thomson, M.D.; Joseph Wrigley.	Slaughter houses and cheese factories are inspected regularly, and other inspections made when called upon.	Scarlatina, 2 cases; diphtheria, 4 cases; typhoid, 2 cases; tuberculosis, 2 deaths.

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is Diphtheria Anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes; no hospital	No cases of diphtheria	Yes	No; no
.....	No	Yes, when cases arise	Yes
Yes . . . . .	.....	Yes	Yes; no
Scarlatina and diphtheria patients are isolated; houses placarded which is found to be of tremendous influence; no isolation hospital; typhoid patients are left to attending physician with suggestions.	Yes, by M.H.O.; only case used appeared in last year's report; fairly successful.	Yes; in scarlet fever and diphtheria.	No
No	Yes	In some cases	No; no
Isolation as directed by attending physician and M. H. O.; no hospital.	No; M. H. O. used it in some cases, and for results see his report.	Yes; under supervision of M. H. O.	No; no
No; no isolation hospital	Not in use	Yes; under supervision of M. H. O.	No; no
No; none; no	No	No	No
Yes; by placarding the house; no hospital.	.....	.....	Yes; once a year; no..
No; some cases of diphtheria treated in Galt general hospital.	Yes, was used in all 4 cases, good results.	Was in two cases; used the appliance of Galt B. of Health in other cases the physician in charge attended to it.	No; only when some one thinks it necessary; no.

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teacher and M. H. O. of contagious diseases supplied?	Give the source of water supplied used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Elmsley, N	No	Wells	No ; no
Elderslie	Yes .....	.....	No
Eastnor .....	.....	Wells ; good water	No
Ekfrid	Yes	Surface wells and some artesian wells, bored this year.	No
Eldon	No	From wells generally ; 15 to 50 feet deep.	No
Easthope, S'	Yes	Ordinary wells ; average 24 ft.	No ; there are some herds of cattle in which it has been found ; cannot say.
Elma	No	Wells ; 25 to 100 ft	No ; no ; no.....
Ennismore	No	Wells ; 10 to 40 ft	No ; no ; no.....
Derby.....	.....	.....	.....
Dumfries, N.....	No	Springs, wells ; generally deep.	Sanitary inspector looks after the cases in a general way ; don't know of any.

TOWNSHIPS.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by an officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses of whole is connected with public sewers?	State No. and kind of noxious trades. (See Sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under the Public Health Act? State in detail the nature of the case, and results of same.
One; no inspection.	No	No	Slaughtering of animals.	No.
Three; inspected; not licensed, simply used as farmers' beef rings; slaughtering about once a week.	No		None	No.
Two; kept in good condition.	No	No	None	No.
Four. not licensed; disposal of offal not inspected; no inspection of carcasses.			None	No.
One; no systematic inspection.	No	No	None	No.
Five; not licensed; mostly fed to hogs or deposited on manure pile; no systematic inspection of meat.	No	None	None	No.
Five; not licensed; some offal boiled and fed to hogs; no systematic inspection of carcasses.	No systematic removal.	No	None	No.
None; no; none; no.	No	No	None	No.
Three; yes; no.				No.
Eight; yes; boiled and fed to hogs; no.	People are instructed to clean up once a year.	No	None	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Dawn	Galbraith, M.D.; A. P. Chalmers, M.D.; J. Webster.	Only on complaint	Scarlatina, 25 cases; diphtheria, 15 cases, 5 deaths; typhoid, 3 cases; tuberculosis, 3 cases. 3 deaths.
Dover	J. S. Ager, M.D.; John Walsh.	Action is only taken when complaint is made to Board.	Diphtheria, 20 cases, 1 death; typhoid, 3 cases, 1 death; tuberculosis, 3 cases, 1 death.
Dereham	H. Minsall, M.D.; Alex. Bell.	Cheese factories, slaughter houses and schools are inspected at intervals; other premises inspected when complaint is made.	Scarlatina, 2 cases, 1 death; diphtheria, 20 cases, 2 deaths; typhoid, 2 cases; tuberculosis, 3 cases, 2 deaths.
Darling	No M. H. O.; J. H. Rintoul.	Only when complaint is made.	Diphtheria, 1 case
Euphrasia	A. L. Danard; A. L. Curry.	Only when complaint is made.	Scarlatina, 1; diphtheria, 1; typhoid, 1; tuberculosis, 1 case, 1 death.
Emily	G. S. Cameron	No	Typhoid, 1; tuberculosis, 2 cases, 2 deaths.
Elizabethtown	Sharpe, M.D.; J. B. Barry.	No; only when complaint is made.	.....
Elzevir & G.	Harper, M.D.; R. W. Miller.	Action taken on complaint.	Diphtheria, 10 cases
Essa	J. Wesley Norris, M.D.; R. T. Banting.	Only when complaint is made.	None reported
Etobicoke	Emerson Bull, M.D.; A. McPherson.	Yes; yes; action also taken when complaint is made.	Scarlatina, 4 cases; diphtheria, 5 cases.
Enniskillen	John Dunfield, M.D.; Geo. V. Bryant.	General sanitary inspection on complaint to any member of Board.	Scarlatina, 5 deaths; diphtheria, 2 deaths; typhoid, 1 death; consumption, 5 deaths.

TOWNSHIPS — *Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exist.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes; we employ sanitary police; no hospital.	No	Yes; under M.H.O	Yes; no
When possible patient is placed in room in upper story of dwelling, furniture and clothing removed, a sheet hung over the door, saturated with carbolic solution.	Yes; results good	Yes	No; no
No; no hospital; isolation has only been practised in Scarletina and diphtheria; no attempt has yet been made to isolate patients suffering from tuberculosis.	Anti-toxine has been used in all severe cases with the most gratifying results.	Only partially; outside physicians don't want the Board to interfere.	Yes; no
No method adopted	Used in one case with good results.	Yes	No; no
Isolated in house	Yes; two benefited; two uncertain.	Yes; by physician attending patient.	No
No	Can't say; no cases reported.	No	No; no
No	Don't know	Yes	No
Yes	Yes; good results	Yes	No
No contagious diseases except typhoid.	No occasion for its use...	No	No; no
Yes; no isolation hospital, but isolated as well as possible in their own homes.	Yes, when thought necessary.	Yes	No no
.....	Yes; good results	Yes	Board acts on complaint; does not require certificate.

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water-supply used on the premises. If from well, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Dawn	No; the physicians notify the secretary or chairman.	Wells; from 20 to 60 ft.	No
Dover	No	Wells; 12 to 14 ft.	No; none to my knowledge.
Dereham	Yes	Wells; about 25 ft.	No systematic inspection of dairy cows; one herd of dairy cows has been pronounced infected; tuberculin test was used and only two of the herd did not respond.
Darling	No	Springs	No; no
Euphrasia	No	Wells; average 25 ft.	No
Emily	No	Wells; 15 to 20 ft.	No
Elizabethtown	Yes	Wells	
Elzevir & G.	No	Wells; average 10 ft.	No
Essa	None ..	Wells	No; no; not used
Etobicoke	No	Wells	No; no
Enniskillen	Yes	Artesian wells; 60 to 90 ft. deep.	No inspection; no tuberculosis to my knowledge.

TOWNSHIPS.—Continued.

How many slaughter house in municipality? Are they licensed on evidences of be- ing kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost? Is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what por- tion of houses to which is connected with public sewers?	State No. and kind of nox- ious trades. (See sec 63, Public Health Act). How licensed and regulated?	Have there been any proso- cutions during the year under Public Health Act? State in detail the nature of the case, and results of same.
None			None	No.
N	No	No	None	No
Four; yes; offal con- sumed by hogs; no systematic inspec- tion of carcasses.	No attempt at re- moval.	None	None	No.
None; no...	No	No	None	No.
One; no license; no inspection.	No	No	None	No.
One; cannot say	No	No	None	No.
		No	None	No.
None	No	No	None	No.
One	Anything done is by householder.	Not a public one...	The most injurious is the sale of noxious liquors, Canada's curse.	No.
Ten; no; used for fertilizing pur- poses; no.	Yes, as regards Long Branch.	Yes, at Long Branch	None	No.
Six; offal fed to hogs.	No	No	None	No.

TOWNSHIPS.—*Continued*

Name of municipality.	Name of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaints of nuisance is made to Board?	Contagious diseases.
Erin	Thos. Young.....	No general sanitary inspection.	Diphtheria, 1 case, 1 death; tuberculosis, 1 case, 1 death.
Esquesing	No M. H. O.; G. H. Kennedy.	General inspection once a year; after that action taken when complaint is made.	Scarlatina, 3 cases; typhoid, 1 case, 1 death; tuberculosis, 1 case, 1 death.
Fitzroy	No M.H.O.; A. Murphy		Scarlatina, 18 cases; diphtheria, 2 cases, 1 death; tuberculosis, 1 case, 1 death.
Ferris.....	J. B. Carruthers, M.D.; M. Nelan.	Action taken on complaint of nuisance.	Chicken pox, 3 severe cases.
Fredericksburgh, N.....	— Ward, M.D.; A. B. Sexsmith.	Action taken on complaint; cheese factories and school houses are regularly inspected.	Diphtheria, 2 cases; typhoid, 2 cases.
Floss.....	J. B. H. McClinton, M.D.; C. S. Burton.	Only when complaint is made.	Scarlatina, 1 case; diphtheria, 6 cases; tuberculosis, 4 cases, 4 deaths.
Flamboro, E	D. A. McClenahan, M.D.; John Bremner.	Yes, when required; No; when complaint is made.	
Fullarto	Wm. Huckney, M. D.; John Wilson.	Yes; yearly.....	Typhoid, 7 or 8 cases reported, 2 deaths; tuberculosis, 1 case, 1 death.
Fenelon.....	J. W. Ray, M.D.; J. B. Powels.	Only when complaint is made.	Typhoid, 1 case; tuberculosis, 1 case.
Faraday	A. T. Embury, M.D.; J. Bremner.	Action taken on complaint.	None reported....
Fredericksburg, S	— Leonard, M.D.; W. H. Rickely.	Only on complaint	
.....	M. Ferguson, M. D.; Wm. Spence.	Action taken only when complaint is made to Board.	None

TOWNSHIPS.—Continued.

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
.....	Don't know	No	No
Yes; by placarding; no hospital.	.....	No; the physician in attendance looks after it.	This is left to public school inspector.
Patients are isolated in their own houses; no hospital.	Yes; very successful ..	Yes	No
No isolation hospital.....	Yes	Yes	No; no
Yes; by placarding.....	Yes	Yes	Yes
Yes; placard houses; no hospital.	Yes; very satisfactory ..	No, but under supervision of attending physician.	No; no
In this rural community it is not considered necessary; no isolation hospital.	Yes; with very satisfactory results.	The M. H. O. attends to this matter.	No; no
Yes, when reported; no hospital.	No diphtheria.....	Yes	Yes; no
Yes; patients and inmates isolated and some one appointed to wait on them; no isolation hospital.	Yes; good results	Not strictly	No
No.....	No	No	No
Yes; all persons on the premises at the time disease breaks out are strictly prohibited from mingling with the public till disease is completely stamped out.	Yes; no cases during the year.	Yes	Yes
No; none; no hospital exists.	No cases of diphtheria in township during the year.	No	Board inspects the schools once a year; no certificate.

TOWNSHIPS—*Continued*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Erin	No	Wells : about 25 ft.	No
Esquering	No	Generally from wells.	No
Fitzroy	Supplied to physicians. .	From wells	No ; no
Ferris	No	Creeks and surface water. .	No
Fredericksburgh, N.	Yes	Wells	No
Floss	Yes	Artesian and other wells, average about 14 ft. .	No ; no
Flamboro, E	No	Wells, 15 to 30 ft	No
Fullarton	No	Wells, from 18 to 40 ft. .	No ; no ; no
Fenelon	No	15 to 30 ft	No
Faraday	No	Wells, usually about 12 to 30 ft. .	No ; none reported
Fredericksburgh, S	Yes	Wells, 10 to 20 ft	No ; no cases
Grey	No	Wells, 12 to 16 ft	No ; no

TOWNSHIPS.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to which is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
One; no; no	No	No		No.
Two; no				No.
None	Yes	No	None	No.
None	No	No	None	No.
2; yes	No	No	None	No.
3; no; no	No	No	None	No.
2 or 3; cannot say	No	No	None	No.
2 small ones; offal fed to hogs or buried; no inspection of carcasses.	No	No	None	No.
Not under municipal supervision.	No	No	No	No.
None	No	No	No	No.
None	No	No	None	No.
1 slaughter house; kept in sanitary condition; buried; no.	No	No	1 slaughter house by permission.	None.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Grantham	— Merritt, M.D.; L. S. Bessey.	When complaint is made.	Tuberculosis, 3 cases, 3 deaths.
Gower, N	F. B. Harkness, M.D.; James E. Craig.	No; action taken on complaint.	None
Gwillimbury, W.	No M. H. O.; Z. Evans.	Only when complaint is made.	Diphtheria, 1 case, 1 death.
Garden Island	R. W. Garrett, M.D.; R. Raymond.	Yes; repeated at intervals during the year.	None
Galway and Cavendish ...	No M. H. O.; P. Collins	No action	Tuberculosis, 2 cases, 2 deaths.
Grimsby, S.	N. P. Henning, M.D.; Edward Irvine	Yes; yes; only when complaint is made to Board.	None
Goulbourn	G. L. Richardson, M.D.; Adam Abbott.	Only on complaint	Scarlatina, 5 cases; diphtheria, 5 cases, 1 death; typhoid, 7 cases, 1 death.
Grimsby, N	James W. Alway, M.D.; W. H. Nelles.	No; only when complaint is made.	Typhoid, 4 cases; tuberculosis, 1 case.
Gower, S.	No M. H. O.; E. Pelton.	No; action taken only when complaint is made.	None
Gordon	No M. H. O.; Wm. Cain	Only on complaint	None
Gainsboro'	J. W. Colver, M.D.; S. Kennedy.	Action taken only when complaint is made to Board.	Scarlatina, 5 cases; typhoid, 2 cases; tuberculosis, 2 cases, 1 death.
Glanford	C. Smith, M.D.; W. M. Calder.	Inspection is only made on complaint or on suspicion of unsanitary conditions.	Diphtheria, 3 cases; typhoid, 1 case, 1 death; consumption, 1 death.
Garafraxa, E.	No M. H. O.; John Preston.	When complaint is made	None
Glenelg	James Dun, M.D.; J. S. Black.	Action only on complaint	Scarlatina, 1 case; tuberculosis, 3 cases, 3 deaths.

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
No hospital; houses are placarded.	Don't know	No	No; no
No; no systematic method adopted.	No diphtheria reported....	Never has been.....	No; no
Isolation is attended to by physician in attendance; no hospital.	Think physicians keep a supply on hand.	No	No
Yes; all cases removed to hospital at Kingston.	.....	Yes .....	.....
No	No .....	.....	No
Patients not taken to separate building; isolated in their own dwelling.	Anti-toxine used in some cases; results seem to be good.	No	No, inspected when complaints are made.
Yes; principally farm houses; no hospital.	Yes; good	Yes	No; no
Placard houses; no hospital.	It has been; with satisfactory results.	It is.....	No
No	Cannot say.....	No	No; no
No contagious diseases	No .....	.....	No
No	No	No	No; no
Isolation has been in charge of medical attendant.	It is used and well spoken of by physicians.	No, under medical attendant.	No; no
Yes, when a case occurs....	No	Yes	No
Yes; by placarding and instructions from physician in attendance.	Not that we know of.....	Yes	Only in case of complaint; no

TOWNSHIPS.—*Continued*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises? If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Grantham	No	Wells, from 20 to 60 ft. .	No ; no
Gower, N	No	Wells, 12 to 15 ft in clay, 30 to 40 ft. in gravel.	No ; no ; test made and no cases reported.
Gwillimbury, N	No	Wells, from 20 to 40 ft. .	No ; never knew of a case in this township.
Garden Island.....		River St. Lawrence.....	Yes ; no cases of tuberculosis have occurred this year.
Galway and Cavendish	No		No
Grimsby, S.....	No	Wells	No ; no ; not used.....
Goulbourn.....	No	Wells	No ; no ; no
Grimsby, N	No	Wells, usual depth 25 ft.	No ; no
Gower, S.....	No	Wells	No ; no
Gordon.....	No	Wells, 10 to 20 ft	No ; no cases.....
Gainsboro'.....	No ; yes.....	Wells, 15 ft	No ; none ; no
Glanford	Some forms have been supplied to physicians.	Wells, from 16 to 40 ft., drilled wells, about 100 ft.	No ; no cases of tuberculosis and no test.
Garafraxa E.....	No	Wells, about 30 ft	No
Glenelg	Yes	Generally from springs and wells ; water is first class.	No dairy within the municipality ; cases of tuberculosis unknown here.

TOWNSHIPS. — *Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to which is connected with public sewers?	State No. and kind of noxious trades. (See Sec. 63, Public Health Act). How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, and results of same.
; not licensed, but kept in sanitary condition.	No	No	None	No.
; no license; no system.	No	No	1 slaughter house...	No.
None	No	No	None	No.
No slaughter houses in municipality.	All garbage and night soil removed by householders under supervision of sanitary inspector.	No	None	No.
None	No	No	None	No.
None; don't know; no.	Not systematic, but is all removed.	No	None	No.
None	No	No	None	No.
; not licensed	No	No	2 slaughter houses ..	No.
None	None	No	None	No.
None	No system of removal	No	None	No.
; no; fed to hogs.	No	No	None	No.
Several; not licensed but permitted while kept in sanitary condition; offal is usually boiled and fed to pigs; no inspection.	No	No	Slaughtering of animals.	No.
One	No	No; district is a rural one.	None	No.
One .....	.....	.....	None	No.

TOWNSHIPS—*Continued*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? Or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Georgina	C. T. Noble, M.D.; Donald Ego.	Action taken when complaint is made.	Diphtheria, 1 case; tuberculosis, 1 death.
Garafraxa, W.	J. Dow, M.D.; Jas. Kennedy.	Yes; inspection once yearly; action taken at other times when complaint is made.	Typhoid, 2 cases; tuberculosis, 3 cases.
Glamorgan	No M. H. O.; D. Williams.	No; no; action taken only when complaint is made.	None
Gwillimbury, E.	No M. H. O.; A. J. Hughes.	Action promptly taken..	Scarlatina, 17 cases; diphtheria, 44 cases, 1 death; typhoid 15 cases, 1 death; consumption, 5 deaths.
Grattan	M. J. Maloney, M.D.; Wm. Gorman.	Action taken only when complaint of nuisance is made.	Diphtheria, 5 cases; tuberculosis, 4 cases, 4 deaths.
Greenock.....	— Morrison, M.D.; J. W. McNab.	Yes; yes; inspection made regularly every year and prompt action taken when complaint is made.	Diphtheria, 6 cases, 3 deaths; typhoid, 1 case.
Gosfield, N.	J. W. Brien, M.D.; Isaac Jackson.	No; action taken when required.	Diphtheria, 7 cases; tuberculosis, 2 cases.
Guelph.....	No M. H. O.; J. McCorkindale.	Yes; yes; yes	Scarlatina, 2 cases; typhoid, 1 case.
Goderich	J. B. Whitely, M.D.; N. Sturdy.	At intervals.....	None
Gwillimbury, N.	No M. H. O.; Henry Sennett.	No.....	Scarlatina, 6 cases; diphtheria, 20 cases, 4 deaths.
Gloucester	J. F. Argue, M.D.; H. E. Billings.	Inspection of slaughter houses and piggeries.	Diphtheria, 8 cases, 3 deaths.
Gosfield, S.	Wm. Mackenzie, M.D.; G. W. Coatsworth.	Action taken only when complaint is made.	Scarlatina, 20 cases; diphtheria, 36 cases; tuberculosis, 5 cases.

TOWNSHIPS.—Continued.

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes, under attending physicians instructions.	No	Either a member of Board or attending physician disinfects.	No; no
Yes; no isolation hospital; patients separated from other members of the family in upper room where possible; free ventilation and disinfectants used.	Yes; has not been required this year.	No	Yes; no
No; house is isolated as soon as report is received from physician in attendance and messenger appointed.	Do not know	Yes	No; no
Yes; under direction of attending physician.	Used largely by one physician; out of 44 cases only 1 death occurred.	Yes, under direction of a physician.	No; no
Yes; no isolation hospital.	Generally used; with satisfactory results.	Yes	No; no
Yes; placarding house and isolation strictly enforced; no isolation hospital.	Yes; cannot give result of treatment.	Yes	Yes; no
Yes; quarantine and placard.	Yes; favourable	Yes	Yes
Yes; isolated in their own homes or sent to isolation hospital in Guelph city.	Yes; results reported good.	Yes	Yes; yes
No	Don't know	Yes	No
Yes; by having houses quarantined; no hospital.	Yes; claimed by some to be a sure remedy if administered in time.	Sometimes	No
Yes .....	.....	Yes .....	.....
No	Yes; with good results; no deaths occurring.	Yes	No

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supplied used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Georgina	Yes .....	.....	No
Garafraxa, W	Yes	Wells and springs, wells about 25 ft.	No dairy in the municipality; no tuberculosis occurred to my knowledge.
Glamorgan	No	Wells, about 6 ft.	No
Gwillimbury, E	Supplied to medical men.	Wells, average about 30 ft.	No cases reported in this township.
Grattan	No, not thought necessary.	Ordinary wells	No; no
Greenock	Yes	Wells, average about 18 ft.	No
Gosfield, N	Yes	Wells	Yes
Guelph	Yes	Wells, 6 to 12 ft	No
Goderich	No	Wells	Don't know
Gwillimbury, N	Physicians only	Wells	No
Gloucester .....	.....	.....	.....
Gosfield, S	Yes	Wells	Don't know

TOWNSHIPS.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by an officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses of whole is connected with public sewers?	State No. and kind of non-ions trades. (See Sec. 63, Public Health Act). How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, any results of same.
None.....			None	No.
1; no; buried or burned; inspection of slaughter houses but not of carcasses.	No	No	None	No.
None; cannot say..	No	No	None	No.
8; no license; no systematic inspection.	No	No	None	No.
1; not licensed, but kept in a good sanitary condition; no systematic inspection.	No	No	No	No.
9; yes; offal is buried or burned; no.	No	No	None	No.
3; no license; fed to hogs.	No	No	None	No.
2; kept in good condition; fed to hogs; no inspection of carcasses.	No system	No	None	No.
3; no.....			None	No.
3; isolated.....	No	No	None	No.
None.....	No	No	None	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Hibbert	No M.H.O. T. Carroll.	Yes, and action taken when complaint is made.	A few cases of tuberculosis.
Huntley	G. H. Groves, M.D.; W. W. Saulter, M.D.; John Argu.	Action is taken when complaint is made.	Scarlatina, 3 cases; diphtheria, 4 cases, 2 deaths; typhoid, 1 case; tuberculosis, 1 case, 1 death.
Humberstone	M. F. Harney, M.D.; A. E. Near.	Inspection is made as required and always in response to complaints.	Scarlatina, 9 cases; diphtheria, 8 cases; typhoid, 12 cases.
Houghton	J. M. Tweedale, M.D.; James Boyd.	No	Diphtheria, 1 case; typhoid, 1 case; tuberculosis, 4 cases.
Hallam	G. F. Jones, M.D.; C. S. Draper.	Yes	Scarlatina, 4 cases, 1 death.
Howick	A. M. Spence, M.D.; Lizzie Walker.	Yes; when complaint is made.	Scarlatina, 3 cases; tuberculosis, 6 cases, 6 deaths.
Howard	A. J. Stevenson, M.D.; George McDonald.	Action taken when complaints are made.	Diphtheria, 7 cases, 3 deaths; tuberculosis, 2 deaths.
Haldimand	James Henderson, M.D.; Thomas Lawless.	General inspection, also action taken when complaint is made.	Scarlatina, 18 cases; diphtheria, 2 cases; typhoid, 4 cases; tuberculosis, 4 cases, 4 deaths.
Huntingdon	E. D. Harrison, M.D.; Hector Wood.	Action taken when complaint is made.	Scarlatina, 1 case; diphtheria, 5 cases.
Hope	A. C. Peatty, M.D.; W. H. McCallum.	Yes, once a year; also action taken when complaint is made.	Typhoid, 6 cases, 1 death; tuberculosis, 5 cases.
Hallowell	A. C. Bowerman, M.D.; Thomas H. Morgan.	Inspection twice a year..	Diphtheria, several cases.
Horton	James Mann, M.D.; Geo. Eady.	No general inspection; action is only taken when complaint is made to board.	Scarlatina, 4 cases, 1 death.
Howich	C. B. Langford, M.D.; G. M. Baird.	Action taken on complaint of nuisance.	Tuberculosis, 5 deaths..

TOWNSHIPS.—Continued.

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
No	No, as far as known to board.	No	Yes
	Yes; results satisfactory	Yes	No
Yes; each patient confined to their room; no isolation; hospital.	Yes	Yes	No
Yes, to a certain extent	No	No	No; no
Yes	Yes; satisfactory results	Yes; by M. H. O	No; no
Yes; houses placarded	No	Yes	No; no
Yes; house placarded; inmates not allowed to mingle with the public.	Yes; all cases recovered when used in time.	Yes	No; no
Yes; separation in private houses; no hospital.	Used in several cases	No; under direction of M. D. or M. H. O.	No; no
Patients isolated as well as possible in their own homes.	Yes; satisfactory	Yes	No, no
Yes; houses are placarded.	No; no diphtheria since its adoption by the profession.	Yes	No; no
Yes; quarantine houses	Yes	Yes; Formaldehyde disinfectant is used.	No; no
Not to any extent; patients are isolated as well as possible.	Yes; results very satisfactory.	Yes	No; no
Yes; house placarded and in case of diphtheria house is quarantined by placing a guard.	Yes; when used early	After diphtheria, but not in other contagious diseases.	No; no

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Hibbert	No	Wells, 25 feet deep	No
Huntley	Yes	From well, 25 feet deep.	No ; no tuberculine test.
Humberstone	No	From drilled wells and springs.	No ; no tuberculosis known to exist in the township.
Houghton	No	Wells, 15 to 50 feet deep.	No ; no
Hallam	Yes	Wells	No
Howick	No	Wells, average 30 feet . .	No : no
Howard	Yes	Wells	No ; no
Haldimand	No	Deep wells, average about 20 to 30 feet.	No ; some cases of tuberculosis ; no tuberculin test.
Huntingdon	No	Wells and spring	No
Hope	No	Wells	No ; no ; no
Hallowell	No	Wells, about 12 feet . . .	No ; no
Horton	No	Wells	No
Howich	Yes	Wells, large number of artesian from 16 to 120 feet.	No

TOWNSHIPS. — *Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
None.....	No.....	No.....	None.....	No.
2; no license given; offal is devoured by dogs.	No.....	No.....	None.....	No.
4; the executive officer attends to them; offal buried and disinfected.	Largely so by householder; no cost.	No.....	No, except one hide packer; duly authorized.	No.
None.....	No.....	No.....	None.....	No.
1; no; fed to pigs; no.	Yes; at household-er's expense.	No.....	None.....	No.
2; no; fed to hogs.	By householder.....	No.....	None.....	No.
2; no; no.....				No.
4; not licensed; no systematic method; no inspection.	No.....	No.....	None.....	No.
2; no; burned; no.	No.....	No.....	None.....	No.
4; not licensed, but law complied with.	No.....	No.....		No.
5.....	No.....	No.....	No.....	No.
2; not licensed; offal is disposed of by being covered with lime.	No.....	No.....	No.....	No.
5; no license; boiled and fed to hogs.	.....		None.....	No.

TOWNSHIPS.—*Continued*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Hungerford	W. M. Mather, M.D.; Joseph Gabourie.	No; no; yes.....	Diphtheria, 4 or 5 cases, 2 deaths; typhoid, a few cases, 1 death; tuberculosis, 1 case, 1 death.
Howland	No M. H. O.; Andrew Russell.	No; no; action taken on complaint being made.	Typhoid, 2 cases, 2 deaths.
Holland	No M. H. O.; James P. Hare.	Only on complaint	Diphtheria, 2 cases, 1 death; typhoid, 1 case, 1 death; tuberculosis 2 cases, 2 deaths.
Harvey	C. E. Bronnell, M.D.; J. S. Cairnduff.	.....	None
Hawkesbury, E	No M. H. O.; Paul Labrosse.	No; no; action taken only when complaint is made.	Diphtheria, 8 cases, 2 deaths; typhoid, 3 cases, 1 death; tuberculosis, 15 cases, 6 deaths.
Hawkesbury, W.....	No M. H. O.; F. A. Thistlethwaite.	No	Diphtheria, 1 case, 1 death; tuberculosis, 3 cases, 3 deaths.
Hamilton	No M. H. O.; J. D. Stewart.	Yes	Scarlatina, 9 cases, 1 death; diphtheria, 2 cases; typhoid, 22 cases, 1 death.
Hilton	— Rounthwaite, M.D.; W. E. Whybourn.	Only when complaint is made.	None
Hagarman and Dunchurch ..	C. O'Gorman, M.D.; F. N. Macfie.	Annual inspection on 1st May by sanitary inspector.	Diphtheria, 15 cases, 1 death; tuberculosis, 3 cases.
Hay	B. Campbell, M.D.; Fred Hess.	School houses, slaughter houses and premises in villages are inspected every year.	Diphtheria, 2 cases, 1 death; typhoid, 18 cases, 1 death; tuberculosis, 1 case, 1 death.
Hillier	Thorburn & Ruttan, M.D's.; Stephen Nease.	No; no; yes	Tuberculosis, 1 case, 1 death.
Hullett	Thomas Agnew, M.D.; James Campbell.	When complaint of nuisance is made.	Scarlatina, 1 case, 1 death; typhoid, several cases.

TOWNSHIPS.—Continued

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagions of cases carried out under the general supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Isolated as well as possible in their houses.	Don't know	No	No; no
No	No cases of diphtheria		No
Houses placarded and otherwise isolated under care of attending physician.	Don't know	By physicians under direction of a member of the board.	No
Yes, when any occur		It is done by the M.H.O.	No
No; physicians isolate patients.	Yes; with good results	No	No; no
No system; houses are placarded and disinfected by attending physician.	Yes; very satisfactory results.	No	No; no
When secretary of board is notified by a physician the house is placarded, disinfectants provided and instructions given as to isolation.	Don't know	Yes	No; no
No	M. H. O. says anti-toxine will be used by him if required.	Yes	No
Isolation is carried out as far as possible; no hospital exists.	Yes; M. H. O. reports favorable results.	Yes	No
It is left to the medical attendents.	It was used in 2 cases but too late to have any effect on one.	Under direction of M.H. O.	Yes; no
No; no	Yes; good results	Yes; under supervision of M. H. O.	No; no
No	No	No	Yes; no

TOWNSHIPS.—*Continued*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supplied used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Hungerford	No	Wells, 15 to 20 feet	No
Howland	No		No
Holland	To physicians only	Wells and springs	No
Harvey	Yes		No
Hawkesbury, E	No	Ottawa river, springs and wells, the usual depth from 12 to 20 feet.	No; yes, tuberculosis existed to some extent last spring, some 20 to 25 animals were destroyed by a veterinary surgeon; don't know if tuberculin test was applied.
Hawkesbury, W	No	Wells, from 20 to 25 feet.	No; no cases of tuberculosis reported; don't know if tuberculin test has been applied.
Hamilton	No	Wells, from 12 to 75 feet.	Yes; inspected once during the year; no cases of tuberculosis have occurred.
Hilton	No	Springs	No; no cases of tuberculosis.
Hagarman and Dunchurch ..	No	Wells and lake water ..	No
Hay	Yes	Wells, 20 to 50 feet	
Hillier	No	Well, 15 to 25 feet	No; no
Hullett	No	Wells, 20 feet	No; no

TOWNSHIPS.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses of which is connected with public sewers?	State No. and kind of noxious trades. (See Sec. 63, Public Health Act). How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, any results of same.
2; no; offal fed to pigs, generally some burned; no.	No.....	No.....	None, except those of butchers.	No.
None	No towns	No.....	None	No.
None	No.....	No.....	None	No.
None	No.....	No.....	None	No.
5; no license; offal generally boiled.	No.	No.....	5 slaughter houses ..	No.
4; no; part buried and part decays.	No.....	No.....	None	No.
5; licensed after inspection has been made; no systematic inspection of carcasses.	No.....	No.....	None	No.
None	No.....	No.....	None	No.
None	Each householder is notified to dispose of their own.	No.....	None	No.
3; no license.....				No.
None	No.	No.....	One manufactory of fish oil.	No.
1; fed on premises; no.	No.	No.....	None	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Hinchinbrook	No M. H. O.; John Hamilton.	No; no; yes	Diphtheria, 26 cases, 1 death; typhoid, 1 case.
Himsworth, S.	J. A. Porter, M.D.; A. E. Frusler.	No; only when complaint is made.	Scarlatina, 103 cases, 1 death; diphtheria, 5 cases; tuberculosis, 2 cases, 2 deaths.
Himsworth, N.	J. B. Carruthers, M.D.; W. F. Ellis.	Supposed to be	None
Huron	D. A. MacCrimmon, M.D.; Angus Martyn.	.....	Scarlatina, 9 cases; typhoid, 1 case; tuberculosis, 3 cases, 3 deaths.
Innisfil	A. T. Little, M.D.; Chas. Palling.	Inspection when complaints are made.	Scarlatina, 2 cases; typhoid, 20 cases.
Joly	No M. H. O.; Thomas Winters.	Only when complaint is made.	None
Jocelyn	No M. H. O.; A. G. Reesor.	No; action taken on complaint.	None
Kingston	No M. H. O.; John Simpson.	Only when complaint is made to Board.	Scarlatina, 2 cases; diphtheria, 3 cases; tuberculosis, 1 case, 1 death.
Kinloss	John S. Tennent, M.D.; Peter Reid.	No; action taken when complaint is made.	Typhoid, 1 case, 1 death; tuberculosis, 2 cases, 2 deaths.
Kennebec	John R. Helm, M.D.; A. Osborne,	Yes; yes	Typhoid, 13 cases, 5 deaths.
Kaladar, A. & E.	No M. H. O.; Moses Lessard.	No; no; yes	Diphtheria, 3 cases, 3 deaths, tuberculosis, 1 case, 1 death.
Kenyon	L. Y. McIntosh, M.D.; A. J. Cameron.	Action only when complaint of nuisance is made.	Scarlatina, 1 death; diphtheria, 1 death; tuberculosis, 3 deaths.
Kincardine	Thomas Bradley, M.D.; R. B. Campbell.	Yes; when complaint is made to the Board.	Typhoid, 2 cases
Keppel .....	.....	Yes	Diphtheria, 4

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Do the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes; quarantined and a man employed to look after patients; no hospital.	Yes; results were good.		No; no
Yes; no hospital; house with all the inmates quarantined; board of health employs a man to look after the family.	Yes; was not used on patient that died; acted well on the others.	Yes	Yes; no
No cases	No cases	Yes	Cannot say
Yes; separation of patient from inmates; no.	No occasion for it this year	Yes	No; no
Yes; houses placarded and quarantined.	Yes	Yes	No; no
No occasion			No
			No
No; no hospital.			No; no
	No; the only cases in which anti-toxine was used ended fatally.	Yes	No; no
No occasion; no	No	No	Yes; no
Yes; no hospital	Don't know	Yes, under supervision of a physician.	No; no
No	No	Yes	No
Yes no hospital	Don't know	Only by attending physician.	No
Yes, in dwelling	Don't know	Sometimes	No

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supplied used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Hinchinbrook	No.....	Wells and springs.....	No ; no
Himsworth, S.....	No.....	Wells, 8 to 40 feet	No ; no
Himsworth, N.....	.....	Water used from springs.	No.....
Huron	No.....	Wells, about 30 feet	No ; no
Innisfil	No.....	Wells, about 30 feet.....	No.....
Joly	No.....	Generally springs.....	No.....
Jocelyn	No.....	Wells	No.....
Kingston	No forms used.....	Wells, from 12 to 40 ft..	Inspection twice a year ; no tuberculosis exists.
Kinless	No	Wells	No
Kennebec	No	Springs and wells ; 10 to 15 feet.	No
Kaladar, A. & E.....	No	Springs	No ; no
Kenyon	No	Wells ; 4 to 40 ft	No ; don't know
Kincardine	No	Wells ; 20 to 30 ft	No ; no cases
Keppell	Yes .....	.....	No ; no

TOWNSHIPS.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what portion of houses of whole is connected with public sewers?	State No. and kind of non-ions trades. (See sec. 63 Public Health Act). How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, any results of same.
None	No system.	No.	None	No.
2; kept in good condition; offal fed to pigs; no inspection of carcasses.	None, except regular cleaning out of privies.	No.	None	No.
1	No.	No.	None	None.
1; not licensed, but inspected quarterly; buried and burned; no.	No.	No.	Slaughtering of animals.	No.
4	No.	No.	No.	No.
None	No.	No.	None	No.
None	No.	No.	None	No.
Five; not licensed; boiled and fed to hogs.	No.	No.	No.	No.
None	No.	No.	None	No.
One; no; no	No.	No.	No.	No.
One; no; not known; no.	No.	No.	None	No.
None	No.	No.	None	No.
Four; no license; offal boiled and fed to hogs.	No.	No.	None	No.
Three	No.	No.	No.	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board.	Contagious diseases.
Keewatin	W. J. Beatty, M.D.; F. J. Cherry.	Yes; yes; once a year, and when complaints are made.	Scarlatina, 6 cases; typhoid, 28 cases, 2 deaths; tuberculosis, 1 case.
Lutterworth.....	C. D. Curry, M.D.; J. H. Hulbig.	When complaint is made.	None
Laurier and Lount.....	No M. H. O.; Rich. Cole.	No	Diphtheria, 1 case
Lobo	P. S. Graham, M.D.; E. R. Barclay.	No; no.....	Scarlatina, 12 cases; typhoid, 4 cases, tuberculosis, 2 cases, 1 death.
Luther, E.....	A. C. Gaviller, M.D.; J. D. Watson.	No; action taken only upon complaint.	Scarlatina, 2 families; typhoid, 2 cases, 1 death; tuberculosis, 1 case, 1 death.
Louth.....	G. M. Bowman, M.D.; C. Snure.	Yes; and action taken when complaint is made.	Typhoid, 2 cases.....
Limerick	E. N. Wager, M.D.; Jas. W. Ham.	No	Tuberculosis, 2 cases, 2 deaths.
London	D. G. McNeil, M. D.; James Grant.	Only when complaint is made.	Diphtheria, 1 death; typhoid, 2 deaths; tuberculosis, 7 deaths.
Lavant	— Kilborn, M.D..... J. M. Browning.		
Luther, W	E. Allan, M. D.; Wm. Duncan.	Only when complaint is made.	Scarlatina, 1 death; diphtheria, 1 death.
Laxton, Digby & L.....	Jarres Grant, M. D.; Wm. Maxwell.	When complaint is made.	Diphtheria, 3 cases, 1 death.
Laird	No M. H. O.; T. H. Schoales.	Action taken only when complaint is made to Board.	None
Logan.....	A. Dalton Smith, M.D.; F. Jacob.	Action taken only when complaint of nuisance is made to Board.	Scarlatina, 8 cases, 1 death; tuberculosis, 2 cases, 2 deaths.
Liskeard	No M.H.O.; John Armstrong.	No	None

TOWNSHIPS.—Continued.

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes, isolation in private families in separate room,	Had no cases	Yes	No
None	Used in some cases; good results.	Yes	No
No	Don't know	No; Board of Health	No
Isolated in a room on top flat.	Have little occasion to use it.	No	No
Yes; house placarded, inmates isolated; no hospital.	No; no occasion to use it.	No	No; no
Not required	Yes	Yes	No; no
No	Don't know	No	No
No; patient removed to hospital; no.	Yes, with good results	No	No
No hospital			No; no
By excluding all but nurse from sick room; no hospital.	Don't know	Yes, by sanitary inspector.	No; no
Yes	Don't know	No	Don't know
No	None in use	No cases	No
		No	No; no

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teacher and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Keewatin	No	Lake of the Woods and wells; from 10 to 20 ft.	No
Lutterworth.....	No	Wells	No inspection made
Laurier and Lount.....	No	Wells and springs	No
Lobo	No	Wells; 20 to 25 ft	No
Luther, E.....	No	Wells; about 25 ft.....	No; no
Louth.....	No	Wells; about 25 to 30 ft.	No; no
Limerick	Don't know	Wells and springs	No
London	No	Wells and springs; about 40 ft.	Not by any officer of Board; none reported
Lavant	No	Mostly spring water ...	No; no
Luther, W	No	Mostly wells; don't know.	No; no; no.....
Laxton, Digby & L....	.....	Wells; 30 to 50 ft.....	No; no cases
Laird	No	Surface water and springs	No
Logan.....	No	Wells; 25 to 60 feet ...	No; no cases of tuberculosis.
Liskeard .....	.....	.....	.....

TOWNSHIPS - *Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by an officer of the Board?	Is there systematic removal of garbage and high soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to which is connected with public sewers?	State No. and kind of statutory law (see Sec. 63, Public Health Act) now in force and regulated?	Have there been any prosecutions during year under the Public Health Act? State in detail the nature of the case, and results of same.
One; in good sanitary condition.	No	No	No	No.
None	None	No	None	No.
None	No	No	None	No.
Two; not licensed.	No	No	None	No.
None	No	No	None	No.
One; yes; buried; no.	Yes	No	None	No.
None	No	No	None	No.
32; yes, fed to hogs.	No	No	One bone boiling establishment.	One for disposing night soil.
None	No	No	None	No.
None	No	No	None	No.
None	Householders remove their own.	No	None	No.
None	No	No	None	One complaint; no prosecution as nuisance was removed.
None			None	No.
None	No	No	None	No.

TOWNSHIPS.—Continued.

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Lindsay & St. Ed	Wm. Gilroy, M.D.; Thos. German.	Only when complaint is made.	Scarlatina, 1 case, 1 death
Lanark	No M.H.O.; A. Rankin.	Action on complaint or through observation of members of the Board.	Tuberculosis, 1 death. ..
Lochiel	A. L. McDonald, M.D.; V. G. Chisholm.	Action taken when complaint is made.	Diphtheria, 11 cases, 2 deaths; typhoid, 1 case, 1 death; tuberculosis, 10 cases, 10 deaths.
Lac Seul	No M. H. O. ; Thos. H. Pritchard.	.....	Tuberculosis, 4 deaths ..
Leeds and Lansdowne, R....	R. J. Gardner, M. D. ; D. F. Bracken.	Only when complaint of nuisance is made to Board.	Scarlatina, 25 cases; tuberculosis, 7 cases, 7 deaths.
Leeds and Lansdowne, F....	J. M. Shaw, M.D.; J. D. W. Darling.	Action taken only when complaint is made to Board.	Typhoid, 3 cases; tuberculosis, 10 cases.
Machar	No M.H.O.; Richd. Cole	No	None
Mountain	Geo. Steacy, M.D.; H. Martin.	Action taken on complaint.	Tuberculosis, 2 deaths ..
Monck	S. Bridgeland, M.D.; W. H. Spencer.	Each member of Board acts as inspector.	None
Mayo	No M.H.O. ; R. Ramsbottom.	.....	None
Marysburgh, N	J. M. Platt, M.D.; L. Williams.	General inspection at intervals.	Tuberculosis, 2 cases....

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State method adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Houses placarded; persons prohibited from entering or leaving; no hospital.	Cannot say	Yes	No
No	None	No	No
Yes; M.H.O. visits place and placards house.	Yes; as far as can be learned the results are very satisfactory,	In some cases	No; no
No	No	Disinfectants are scarcely ever used.	No; no
Yes	No	Yes	No
Yes; placarding; no	Yes; good results	Yes	No; no
None	Don't know	Usually under the personal supervision of some member of the Board.	No; no
No	Don't know	No	No
No occasion; no hospital.	No diphtheria in tp	Yes	No
As recommended by physicians.	.....	.....	No; except on complaint.
Yes	No	Yes	Yes; no

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Lindsay & St. Ed	Have not required them yet.	From wells and springs	No
Lanark	No	Wells	No
Lochiel	No	Wells, streams and springs.	No; no cases reported.
Lac Seul.....	Yes		No; no cases have occurred.
Leeds & Lansdowne, R.	No	Wells; from 15 to 50 ft.	No
Leeds & Lansdowne, F.	No	Wells	No
Machar	Yes	Wells; 10 to 20 ft.	No
Mountain	No	Wells; 10 to 40 feet	No inspection
Monck		Wells; 8 to 20 feet	No cases of tuberculosis have occurred.
Mayo	No	Wells and springs	No
Marysburgh, N.	Yes	Wells; 10 ft.	No; no

TOWNSHIPS—*Continued.*

How many slaughter houses in township? Are they licensed on either side of the high kept in good sanitary condition? How are they disposed of? Is the system making inspection of car- casses by an officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a night sewerage system? If so, what per- centage of houses and is connected with public sewers?	State No. and kind of man- ure traded. See sec. 6 Public Health Act. If so licensed and regulated?	Have there been any cases of cattle during the year under Public Health Act? State in detail the numbers of the case, any results of same.
None	No	No	None	No.
None	No	No	None	No.
Four; fairly good; buried; no.	No	No	Two tanneries.....	No.
None; no; usually burnt; no.	No	No	None	No.
None	No	No	None	No.
Four; no; buried or fed to hogs; no.	No	No	None	No.
One; offal used as fertilizer.	None	No	None	No.
One; no inspection.			None	No.
One	Each householder re- moves his own.	No	None	No.
None			None	No.
No; no	No	Yes	None	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Minto.....	W. A. Harvey, M. D.; W. D. McKellar.	Action is taken on complaint.	Scarlatina, 6 cases; tuberculosis, 3 cases, 3 deaths.
Mettawan	M. James, M. D.; A. Ridout.		
Moulton.....	N. Hopkins, M. D.; Henry Logan.	No; no; only when complaint is made.	Diphtheria, 1 case, 1 death; tuberculosis, 2 cases, 2 deaths.
Marysburgh, S	H. Bredin, M.D.; W. B. Head.	Action taken when complaint is made	Diphtheria, 1 case.....
Malden	F. J. Parke, M.D.; Jas. Honor.	Action taken only when complaint is made to Board.	Diphtheria, 1 case, 1 death; typhoid, 1 case, 1 death; tuberculosis, 1 case, 1 death.
Medora and Wood.....	No M.H.O.; Henry C. Guy.	General inspection at intervals by members of Board.	None
Maidstone.....	R. F. Rorke, M.D.; M. McHugh.	No; no; action taken only when complaint is made to Board.	Diphtheria, a few cases; typhoid, 4 cases; tuberculosis, 5 deaths.
McKellar	No M.H.O.; G. B. Lee.		Diphtheria, 1 case, 1 death.
Mersea	Chas. Chamberlain, M. D.; Alfred Hairsine.		Scarlatina, 6 cases, 2 deaths; diphtheria, 10 cases, 4 deaths; typhoid, 11 cases; tuberculosis, 4 cases, 4 deaths
Murray	P. J. Clune, M.D.; J. R. Garrett.	Action taken when complaint is made.	Scarlatina, 9; diphtheria, 1 case, 1 death; tuberculosis, 5 deaths.
Mono	— Island, M.D.; Andrew Henry.	No action taken. only when required.	Diphtheria, 6 deaths; tuberculosis, 3 deaths.
Monaghan, N	W. T. Greer, M.D.; G. W. Sennett.	Yes; yes	

TOWNSHIPS.—*Continued,*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes; house placarded	No cases	Yes	No; no
.....	.....	.....	No
.....	Yes; results good	No	No; no
Yes; house quarantined: no hospital.	No	Yes	No
Yes	Yes	Under direction of attending physician.	No
Yes; when any cases occur.	No	Yes	Yes; no
Isolation is practised except in the case of tuberculosis.	Cannot say.	Yes	No; no
Yes .....	.....	Yes .....	.....
Isolated at their homes; no hospital.	Not generally used	Not generally	No; no
Yes, as far as possible in private houses; no isolation hospital.	It was used late in one case but death resulted.	Yes	No
No isolation hospital.....	.....	Yes, by the physician in attendance.	No
Yes; isolated in hospital at Peterboro'.	Yes; used frequently; results satisfactory.	Yes, under M.H.O.	No; no

TOWNSHIPS.—Continued.

Names of municipalities.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supplied used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Minto	No	Wells: 20 to 30 ft	No; no
Martawan	No	Spring water	No; no
Moulton	No	Wells; from 6 to 16 ft.	No; no
Marysburg, S	No	Wells, not properly cared for; 8 to 60 feet.	No; yes; 1 case
Malden	No	Drilled wells	No
Medora & Wood	No	From lakes and wells ...	No; no
Maidstone	We keep them usually to supply the schools.	Wells	No; no; no
McKellar			
Mersea	Yes	Wells; from 20 to 50 ft.	No; no tuberculosis; no tuberculin test has been made.
Murray	Yes	Wells and springs; 30 ft.	No; no; no test made ..
Mono	No	Wells and springs	Don't know
Monaghan, N	No	Wells; 10 to 30 ft.	No; no

TOWNSHIPS.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of health inspection? How is cold meat kept in great sanitary condition? How is cold meat disposed of? Is there systematic inspection of carcasses by an officer of the Board?	Is there systematic removing of garbage and refuse? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewer system? If so, what percentage of houses and shops is connected with public sewers?	State No. and kind of new laws (under No. 304) Public Health Act, 1882 licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the names of the cases, any result or same.
Four; no; no	No	No	None	No.
None	None	None	None	No.
Two; no license; cooked and fed to hogs; no.			None	No.
Four; no; fed to hogs	No	No	None	No.
One; not licensed but kept in sanitary condition.		No	None	No.
Two; during the summer months buried; no.	All burned or used on land as manure.	No	None	No.
Three, conducted on a small scale.	No	No		No.
			No	
One; not licensed; offal is buried; no inspection of carcasses.	No	No	None	No.
Two; yes; buried; no.	No	No		No.
None	Not done systematically.	No	None	No.
Six; yes; boiled and fed to hogs; no.	No	No	None	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board.	Contagious disease.
Middleton.....	J. W. Ranwick, M.D.; John Burnett.	Action taken only when complaint is made.	Tuberculosis, 2 deaths ..
Mikado	No M.H.O.; T. Briderback.	No general sanitary inspection.	None
Matchedash	No M. H. O.; E. W. Kitchen.	Action taken when nuisance is reported.	None
Muskoka	A. P. Cornell, M.D.; R. E. Suttaby.	Only on complaint to any member of the Board.	Tuberculosis, 2 cases. 2 deaths.
Moore	F. R. Seager, M. D.; James Watson.	Action taken when complaint is made	Diphtheria, 1 case, 1 death; tuberculosis, 7 cases, 7 deaths.
Medonte	Jas. Harvie, M.D.; A. W. Heaslip, M.D.; T. D. Robinson.	Action is taken when complaint is made.	Scarlatina, 1 case; diphtheria, 7 cases, 1 death; typhoid, several cases, 1 death; tuberculosis, 4 cases, 4 deaths.
Monmouth	W. Giles, M.D.; J. H. Anderson.	House to house inspection in the month of May, and action taken when complaint is made.	None
Metcalfe	A. Nixon, M.D.; John Hutton.	.....	Scarlatina, 2 cases; tuberculosis, none; typhoid, 2 cases.
March	G. H. Groves, M. D.; Thos. Richardson.	No; action taken when complaint is made.	Typhoid fever, 13 cases..
Mara	Wm. Gilpin, M.D.; W. R. McPhee.	Action taken only when complaint is made to Board.	None
Marmora and Lake	W.G. McKechnie, M.D.; H. M. Jones, M. D.	Action taken when complaints are made.	Scarlatina, 1 case; diphtheria, 2 cases, 1 death; typhoid, 3 cases, 1 death; tuberculosis.

TOWNSHIPS — *Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Houses placarded.....	None used.....	When necessary.....	No; no.....
.....	.....	.....	No public schools.....
None reported.....	No.....	No.....	When called upon; no action taken <i>re</i> vaccination.
Consumptive patients are treated at the Sanatorium.	Not used.....	Yes.....	The trustees visit the school occasionally to make general inspection.
Not in all cases.....	Some times used.....	Not always.....	No, not in all cases.....
Yes; house placarded....	Don't know.....	Yes.....	No; no.....
As well as possible in private houses; no hospital.	No cases of diphtheria in township.	No.....	No; no.....
No.....	No.....	Yes.....	Yes; no.....
Yes.....	Yes, M.H.O. uses it; results are very satisfactory; other physicians use it but have not heard the results.	Yes.....	No.....
.....	Yes.....	Yes; physicians say it gives favorable results.	Yes.....
No.....	Yes; results good.....	No.....	No.....

TOWNSHIPS.—*Continued*

Name of municipality.	Are farms for modification by the her and M. W. O. of epizootic diseases plotted?	Give the source of water sup- plied in the town. If from wells, state a good depth of water being stratum.	Is there systematic inspec- tion of dairy cows made during the year? Have cases of tuberculosis oc- curred? and state whether the tuberculin test has been used.
Middleton	No	Spring crosses and wells: No from 10 to 50 ft.	
Mikado		Water from bay	
Matchedash	Yes, when required	Wells from 12 to 16 feet.	No; no
Muskoka	No	Wells	No
Moore	Yes	Well 12 to 20 feet	No; no
Medonte	Yes	Wells, generally	No; no
Monmouth	No	Springs and wells; wells are from 6 to 16 feet deep.	No; no
Metcalf	No	Wells	No; no
March	Yes	Wells; average about 15 feet.	Inspection has been car- ried out, but not sys- tematically; tubercu- lin test has been used in some herds.
Mara	No; no	Water is got mostly from wells from 10 to 90 feet deep.	No; no
Marmora and Lake	No	Wells about 25 feet	No

TOWNSHIPS.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by an officer of the Board?	Is there systematic removal of garbage, and what only? If so, in what boxes or cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what portion of houses to which is connected with public sewers?	State No. and kind of tax on trades. (See Schedule, Public Health Act.) How is it assessed and regulated?	Have there been any persons taken during year under the Public Health Act? State in detail the nature of the case, and results of same.
One; licensed; fed to hogs.	No	No	None	No.
None	Yes, removed regularly by and at cost of Mikado Gold Mining Co.		None	No.
None	No	No	None	No.
One; not licensed; offal fed to hogs; no inspection of carcasses.	No	No	None	No.
None	Owners are expected to keep their premises in a sanitary condition.	Yes; in villages	None	No.
Five; no; offal fed to hogs; no.	No	No	None	No.
None	Each household looks after his own	No	None	No.
None	From school for use; average cost \$4.00.	None	None	No.
None	No	No	None	One physician was brought before a magistrate for not reporting a case of diphtheria.
No	No	No	None	No.
None	No; only by house holders.	No	None	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Macauley	S. Bridgland, M. D.; Wm. Gohn.	No; when complaints are made.	Typhoid, 1 case
McKim	R. B. Struthers, M.D.; Thos. Stoddart.	Action taken when complaint is made.	Diphtheria, 15 cases; typhoid, 5 cases; tuberculosis, 1 case, 1 death.
McNab	S. W. Ward, M.D.; J. D. McNab.	Yes, in June of every year, and repeated when complaint is made.	Scarlatina, 45 cases; tuberculosis, 4 cases, 4 deaths.
McLean and R	No M. H. O.; W. H. Brown.	Yes	None
r	R. L. Ireland, M. D.; Geo. Laking.	Upon complaint	Scarlatina, 3 cases reported; diphtheria, 12 reported, 3 deaths; typhoid, 2 cases; tuberculosis, 3 cases, 3 deaths.
Minden	C. D. Curry, M.D.; S. F. Stinson.	.....	Scarlatina, about 15 cases; 1 death.
Mariposa	G. W. Hall, M.D.; J. B. Weldon.	One thorough inspection every year and at intervals.	Scarlatina, 5 cases; diphtheria, 27 cases, 2 deaths; typhoid, 15 cases; tuberculosis, 1 case, 1 death.
Maryborough	J. J. Cassidy, M.D.; Ed. Dynes	General inspection	Typhoid in one family; 1 death in another family from same cause.
Melancthon	Samuel Moore, M. D.; James Brown.	A general inspection is made.	Diphtheria, 5 cases, 1 death; typhoid 1 case; tuberculosis, 3 cases, 3 deaths.
Manvers	W. W. Nasmith, M.D.; J. J. Preston.	No; action taken when complaint is made.	Diphtheria, 3 cases

TOWNSHIPS.—Continued.

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physician? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes, when required	No cases occurred in the township.	It has always been done.	No ; no
No isolation hospital ; practical isolation obtained in contagious cases.	Yes ; results very satisfactory.	Yes	No ; no
Yes ; patients isolated.....	Don't know	Ye	No
Yes, when occasion requires ; no.	No cases	Yes	Yes, as to inspection
Yes ; disinfection and complete isolation ; no hospital.	So far as heard from fairly successful.	Yes	No ; no
Yes	Yes	Yes	Yes
Placarding is thoroughly done; patients and nurses are isolated.	Yes ; it is very satisfactory.	Partially	Yes ; no
Yes .....	.....	Yes	Yes
Yes ; patients and inmates isolated ; no isolation hospital.	Yes ; good results	Yes	Only when complaint is made
Yes ; houses isolated and placarded ; no hospital.	No	Yes, under supervision of M.H.C.	No ; no

TOWNSHIPS — *Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supplied used on the premises. If from wells state its depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculous udder, red, an I state whether the tuberculin test has been used.
Macaulay	No	Wells of various depths.	No
McKim	No	Wells	No
McNab	No	Wells from 4 to 50 feet.	In some localities, but not general.
McLean and R.	No	Wells 20 feet deep	No
Mulmur	Not yet, but intend to ..	Wells : cannot say	No ; no
Minden	No	Springs	No ; no
Mariposa	Yes	Wells ; about 20 feet	No ; no ; no
Maryborough .....	.....	Wells .....	.....
Melancthon	Yes ; no	Wells ; 30 to 50 feet	No ; no
Manvers	No	Wells and springs ; 10 to 100 feet.	No ; no

TOWNSHIPS. — *Continued.*

How many slaughter-houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is filth disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses of which is connected with public sewers?	State No. and kind of nuisances trades. (See sec. 68, Public Health Act) How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, any results of same.
One; no license, but under supervision of Board.	No	No	None	No.
Three; not licensed; inspected by M.H.O. only.	No	No	None	One for not reporting diphtheria case; nominal fine imposed.
Three; not licensed; offal buried.	No	No	None	No.
One; not licensed ..	No	No	No	No.
Three; no; cannot say; when complaint is made; inspection made by the Board.	No	No	None	No.
One	No	No	None	No.
Two; no	No	No	None	No.
One	No	No	None	No.
Three; not licensed; offal destroyed on premises; no inspection.	None	No	None	No.
Two; not licensed; no.	No	No	None	No.

TOWNSHIPS.—Continued.

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board.	Contagious Diseases.
Mornington	— Johnston, M.D.; John Watson.	Yes, as required; general only when complaints are made.	Scarlatina, 12 cases; diphtheria, 3 cases; tuberculosis, 1 case.
Monaghan, S.	— Montgomery, M. D.; A. Maycock.	No; action taken only when complaint is made.	Tuberculosis, 3 cases, 3 deaths.
McMurrich	— Barber, M.D.; D. C. McFarlane.	Action taken when complaints are made to Board.	None
McKillop	No M. H. O.; John C. Morris n.	No general inspection...	Tuberculosis, 1 death ...
Nottawasaga	L. McAllister, M. D., also Sec'y.	.....	Diphtheria, 4 cases; tuberculosis, 4 cases, 4 deaths.
Nissouri, East.....	R. E. Towle, M.D.; W. E. Andison.	Action taken only when complaint is made.	Scarlet fever, 10 cases; diphtheria 2 cases; typhoid, 4 cases; tuberculosis, 2 cases, 2 deaths.
Nichol.	— Paget, M.D.; John R. Wissler.	When complaints are made.	Tuberculosis, 1 case.
Nipissing	J. A. Porter, M.D.; Wm. Maltby.	.....	Diphtheria, 1 case.
Norwich, North	W. R. Watson, M.D.; Chas. E. Burgess.	.....	Tuberculosis, 1 case, 1 death.
Niagara.	R. J. Timble, M.D.; C. Fisher.	Only on complaint.	Tuberculosis, 3 cases, 3 deaths.
Nipigon (unorganized)	No M. H. O.; James Cowie.	No.....	None.
Nissouri, West	F. W. Hughes, M.D.; Wm. Lee.	General inspection repeated three times during the summer months.	Scarlatina, 4 cases, 1 death; diphtheria, 1 case; tuberculosis, 4 cases, 4 deaths.

TOWNSHIPS.—*Continued*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any Isolation Hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	In disinfection after contagious diseases carried out under the personal supervision of an officer of the Board.	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year.
Yes; as well as possible ..	It has been used, but not in general use; results considered good.	Not always	Only as occasion requires.
No isolation hospital, but patients isolated in their homes.	Used when necessary.....	Yes	No; no
.....	No occasion to use it.....	No disease of this kind to disinfect.	Yes
No occasion	Don't know	No contagious diseases..	No; trustees are notified to clean school yards and closets every May.
Yes; infected houses placarded and families confined to their residences for a certain period; no hospital.	Anti-toxine is used but cannot say anything as to the results.	Yes	No
Yes; by isolating the patients, placarding houses.	No	Under supervision of M. H. O.	No; no
Yes; sent to Guelph hospital.	No	Yes.	No
Yes; isolated in their homes.	No	Yes; by sanitary inspector.	No
Yes; houses placarded and isolation of patients strictly carried out.	.....	Yes; under direction of M. H. O.	Yes; no
No; no hospital.	No	No	No
No.	Yes	No Board of Health	No
Yes; no isolation hospital..	Don't know	Yes.	No; no.....

TOWNSHIPS.—*Continued*

Name of municipality.	Are forms of notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Mornington	Yes	Generally from wells; 40 ft.	No; have not heard of any this year.
Monaghan, S	No	Wells; 25 to 75 feet	No; no
McMurrieh	No	Wells; from 10 to 20 ft.	No; no
McKillop .....	.....	Wells; 20 feet	No, unless complaint made.
Nottawasaga	No	From wells, usual depth from 20 to 50 feet.	No
Nissouri, East	Yes.	From wells, 15 to 40 feet.	No inspection; has not been used.
Nichol	Yes	Wells, from 6 to 40 feet.	No; no; yes some tests have been made; no tuberculosis found.
Nipissing	No	Wells, 12 to 18 feet.	No
Norwich, North	Yes.	Wells, 30 feet	No; no
Niagara	No	Wells, average about 20 feet.	None
Nipigon (unorganized) .....	.....	From creek and Nipigon river.	No
Nissouri, West	Yes; to M.H.O.	From wells, about 30 feet.	No; none

TOWNSHIPS.—*Continued*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act.) How licensed and regulated.	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, and results of same.
Two; no, but kept in good sanitary condition: offal burned; not systematic.	No	No	None	No
None	No	No	None	No
None	No	No	None	No
No license	No	No	None	No
None .....	.....	.....	.....	None
Two; not licensed no.	.....	.....	One tannery not licensed.	None.
One; no; no; offal generally fed to hogs; no.	.....	No	Slaughter house	No; only 2 cases; nuisance removed.
None	No system	No	None	No.
Three; no.	No	No	None	No.
One; unlicensed; no inspection of carcasses.	No	No	None	No.
None	Each householder removes their own.	No	None	No.
Three; yes; licensed; offal boiled and fed to hogs on premises.	No	No	None	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Normandy.	P. McLean, M.D.; Geo. Hopf.	Partial. no; action taken when complaints are made.	Typhoid, 5 cases; tuberculosis, 1 case, 1 death.
Nairn, Lorne and Hyman...	G. F. Jones, M.D.; H. L. McLean.		Consumption, 1 case, 1 death.
Nepean.	J. W. Shillington, M.D.; F. W. Harmer.		Scarlatina, 11 cases; Diphtheria, 16 cases, 2 deaths.
Orford North.	L. M. Williams, M.D.; Richard Seldan.	Yes; yes.	Scarlatina, 1 case.
Orford.	P. M. Davey, M.D.; Henry Watson.	When complaints are made action is taken.	Tuberculosis, 9 cases....
Oneida.	W. E. Olmsted, M.D.; John Senn.	Action taken only when complaint is made.	Typhoid, 5 cases, 1 death
Osnabruck.	D. Jamieson, M.D.; H. E. Hodgins.	No; no; action taken only on complaint.	Tuberculosis, 3 cases, 3 deaths.
Onondaga.	J. Ogden, M.D.; S. J. McKelvey.	Action is only taken when complaint of nuisance is made to Board.	Scarlatina, 3 cases; tuberculosis, 1 case, 1 death.
Oxford, East.	J. McLurg, M.D.; J. Peers.	Action taken only when complaint is made.	Scarlatina, 15 cases; diphtheria, 1 case; typhoid, 2 cases.
Oxford.	J. A. James, M.D.; Wm. Lindsay.	No; action taken only when complaint is made.	Diphtheria, 4 cases, 1 death; typhoid, 1 case; Tuberculosis, 2 cases, 2 deaths.
Oro.	W. H. Clutton, M.D.; H. J. Tudhope.	Only when complaint is made to Board.	Scarlatina, 4 cases, 1 death, diphtheria, 6 cases, 2 deaths; typhoid, 13 cases.

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State method adopted and whether an isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Fairly well; placard houses; no isolation hospital.	Yes; results good especially as a preventive.	Yes.	No
No contagious diseases.	No .....	.....	Yes.
Yes; houses placarded, visitors prohibited, attending school and public meetings not allowed, patients are placed in upper rooms of the house.	Only by part of the profession, results most satisfactory where used.	No; it is done according to instructions given by M.H.O., viz: fumigation with sulphur, and steam boiling all clothing with disinfectants, carbolic acid, bichloride of mercury, etc., washing wood-work and walls, whitewashing or removing paper and re-papering.	No; no
By placard only .....	.....	.....	Yes; no
Always quarantined when cases occur.	Yes; favourable results. ..	Yes.	No; no
Isolation ordered, outsiders not allowed to visit houses placarded.	Do not know	Yes.	No; no
Houses placarded and mingling with the public forbidden.	Not in use	Yes.	No
Not necessary, no hospital.	No	No	No; no
Yes	No	No	Yes; no
No; no isolation hospital.	Don't know	No	No; no
When possible; no hospital.	Yes; where membrane has developed no benefit was observed, where used very early the cases proved mild.	Yes; when Board is notified.	No; no

TOWNSHIPS.—*Continued*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supplied used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Normandy	Yes.	Wells, 15 to 30 feet.	No.
Nairn, Lorne and Hyman...	No	Springs	No
Nepean	No	Wells, varying from 8 to 25 feet deep.	.....
Orford, North	No	Wells, 20 feet	No ; none.....
Orford	No	Wells, varies according to location and soil.	No
Oneida	Not for teacher .....	.....	No dairy.
Osnabrock.	No	Wells, 16 to 40 feet, and St. Lawrence river....	No
Onondaga	No	Wells	No
Oxford, East, °.....	Yes.	Wells.	No
Oxford	No	Wells, about 20 feet	No ; no ; no.....
Oro	No	Wells, from 10 to 150 feet.	No

TOWNSHIPS.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses of whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, any results of same.
Three; yes; cooked and fed to hogs; no.	No	No	None	No.
None	No	No	None	No.
.....	.....	No .....	.....	No.
.....				
Two; yes; boiled; no.	No	No .....	.....	No.
None	Yes.	No	None	No.
None	No	None	None	No.
None	No	None	No	No.
One; not licensed; offal used as fertilizer; no systematic inspection of carcasses.	No	No	None	No.
Four; no; no.....	No	No	None	No.
None; 'no.	No	No	None	No.
Two; no; carted some distance from dwelling and fed to hogs; nc.	No	No .....	.....	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Orillia.	G. H. Corbett, M.D.; John C. Rose.	Action is only taken upon complaint.	Diphtheria, 1 case; typhoid, 4 cases, 2 deaths; Tuberculosis, 3 cases, 3 deaths.
Otonabee	J. M. Shaw, M.D.; J. M. Drummond.	Partial inspection and action taken when complaint is made.	Scarlatina, 2 cases; diphtheria, 1 case; tuberculosis, 1 case, 1 death.
Oakland.....	Thos. H. Mott, M.D.; Henry Key.	Only on complaint.	None
Oakley	S. Bridgeland, M.D.; Edward Elliott.	Only on complaint.....	None
Ops.	Thos. W. Pool, M.D.; W. F. O'Boyle.	Yes; as far as expediency requires cheese factories and slaughter houses regularly, public schools and other premises occasionally.	Typhoid, 2 cases, 1 death; Tuberculosis, 3 cases, 3 deaths.
Oso.	No M. H. O.; S. C. Bourk.	No; only when complaint is made.	Scarlatina, 10 cases, 1 death; tuberculosis, 2 cases.
Pittsburg	None; Chas. Belwa....	None	Typhoid, 1 case, 1 death; tuberculosis, 2 cases, 2 deaths.
Proton	R. M. Mitchell, M.D.; Thos. Laughlin.	Action only taken when complaint is made to Board.	Tuberculosis, 3 cases, 3 deaths.
Pilkington ..	—, Robertson, M.D.; G. F. Cromar.	Yes; repeated twice every year.	Scarlatina, 3 cases, 1 death.
Peel.	John D. McNaughton, M.D.; James Wallace, M.D.; Magnus Henderson.	When complaint is made.	None reported....

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria, anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
The house is placarded and an officer placed in charge to attend to the wants of the family, and to prevent any inmates from mingling with the public.	Yes.	Yes.	The township is divided into districts, and a member of the Board inspects the schools in his district; no.
Placarding houses	No	Yes.	No; no
No; no .....	.....	No	No; no
No provision.	Don't know	Yes.	No
Yes; as far as can be done at their homes; no isolation hospital.	Yes; results have been good.	Yes.	No
Fairly well; no isolation hospital.	No cases this year	No; physician in charge attends to this.	No
Yes; patients removed to hospital in Kingston.	Don't know	Don't know; physician in attendance order disinfection to be carried out.	Don't know.....
No; no hospital.....	Don't think it is	No.	No; no.....
Yes; houses placarded; no isolation hospital.	Used when diphtheria exists; good results.	Yes.....	Yes; no.....
As far as possible in their own homes.	Yes; cannot say to what extent.	Yes; by M. H. O. and sanitary inspection.	No; no.....

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supplied used on the premises. If from wells, state usual depth of water bearing stratum?	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Orillia	No	Spring wells, 12 to 40 feet.	No; none.....
Otonabee	No	Wells, 25 feet	No; no
Oakland.....	Yes.	Wells	No; no
Oakley	To M. H. O. only .....	.....	None
Ops	Yes; but happily they are seldom used.	Wells, varying from 10 to 50 feet in depth, good quality, with hard pan gravel, rock 'bottom.	Not of dairy cows in particular, members of Board and local veterinary are on the alert for lump-jaw and tuberculosis, and are summarily dealt with, 3 cases of lump-jaw were reported to our veterinary, but upon examination they proved to be from other causes than actinimycosis.
Oso	No	Springs	No; no
Pittsburg	No	Wells	No; no.....
Proton	Yes	Wells; 20 feet deep.....	No
Pilkington	No	Wells; about 25 feet.....	No: no.....
Peel	No	Wells	No inspection; a few cases occurred; test made and cattle destroyed.

TOWNSHIPS.—Continued.

How many slaughter-houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what portion of houses of whole is connected with public sewers?	State No. and kind of nuisances trades (See Sec. 68, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, and results of same.
Three; not licensed; used for feeding purposes; bones dried and sold	No	No		None.
Three; not licensed; but inspected and kept in good condition.	No	No	None	No.
Two; no license; usually fed to hogs; no.	No	No	None	No.
None	None	No	None	No.
Four; yes; boiled or strained and fed to hogs; no regular inspection of carcasses; no complaint made of meats offered for sale.	No; garbage as a rule is added to manure pile; night-soil if not absorbed in dry earth closets or used as manure is buried.	No	None	No.
None	No	No	None	No.
None	Don't know	Not required	None	No.
None	No	No	None?	No.
None	Deposited on land	No	None	No.
None	No system	No	None	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board.	Contagious diseases.
Petewawa	A. T. Irwin, M.D.; Geo. Guertin.	Only when complaint is made.	Diphtheria, 1 case, 1 death.
Percy	J. M. Clemmison, M.D.; R. P. Hurlbert.	Action taken by Board when complaints are made.	Scarlatina, 2 cases; diphtheria, 8 cases, 1 death.
Perry	—, Barber, M.D.; E. B. Clearwater.	Inspection in May	None
Plympton	P. McG. Brown, M.D.; J. K. Cairns.	Action taken only when complaint is made.	Scarlatina, 10 cases, 1 death; diphtheria, 1 case.
Pelham	Wm. M. Comfort, M.D.; J. C. Crow.	Only when complaint is made.	Scarlatina, 2 cases; tuberculosis, 2 deaths.
Papineau	—, James, M.D.; R. Ranson.	Only when complaints are made.	None
Puslinch	No M. H. O.; James McLean.	General sanitary inspection every spring and fall.	Scarlatina, 4 cases; diphtheria, 2 cases.
Palmerston, etc.	John Elkington, M.D.; Isaac Altan.	Only when complaint is made.	Typhoid, 1 case, 1 death; tuberculosis, 1 case, 1 death.
Pelee	No M. H. O.; John McLellan.	Only when complaints are made.	.....
Pickering	No. M. H. O.; D. R. Beaton.	General inspection in villages, in other parts of municipality upon complaint.	Diphtheria, 1 case; tuberculosis, 7 deaths.
Plantagenet, N.	N. Gaboury, M.D.; J. Belanger.	Yes; once or twice annually.	Scarlatina, 6 cases, 1 death; diphtheria, 5 cases, 2 deaths; tuberculosis, over 20 cases, 3 deaths.

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? (Give results of treatment in all cases where possible.)	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Not as well as it should be.	Cannot say .....	.....	Don't know....
Yes; patients and inmates are kept in the house where disease exists.	Have treated 3 cases of diphtheria with anti-toxine, with good results (J. M. C.)	Yes	No; no.....
.....	Yes .....	.....	No
Yes; when cases are reported houses are placarded and patients isolated from the rest of the family; no hospital.	Yes; results are favorable.	Yes	No; no.....
Yes; no hospitals; usually by warning the public by means of placard on premises.	Can't say	Yes, when necessary....	No
No.....	No.....	Yes	No
Yes; house placarded.....	No.	Yes	Systematic inspection carried out.
No; none; no.....	.....	.....	No
.....	.....	.....	No; no.....
Yes; no hospital	No.....	Yes	Yes, annual inspection made; no.
Yes; kept isolated; no hospital.	When necessary; good....	Yes	No; no.....

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teacher and M. H. O. of contagious diseases supplied?	Give the source of water supplied used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Petewawa		Spring and well water.	No
Percy	Yes	From clay stratum; 25 to 50 feet deep.	No; none
Perry	No		No; none
Plympton	M. H. O. supplied only.	Surface wells	No; no cases of tuberculosis.
Pelham	No		No; no tuberculosis
Papineau	No	Streams	No
Puslinch	No	Wells and springs	No; no
Palmerston, etc.	No	Wells and springs; usual depth 6 to 30 feet.	No; no
Peele	No	Lake and artesian wells.	No
Pickering	Yes	Wells; good water, from 20 to 60 feet.	No; no
Plantagenet, N.	Yes	Wells and springs	No

TOWNSHIPS.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by an officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses is connected with public sewers?	State No. and kind of taxation trades. (See Sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under the Public Health Act? State in detail the nature of the case, and results of same.
None.....	On school premises only.	No		No.
One; offal is fed to hogs; no.	No	No	None.....	No.
One; sanitary condition fairly good.	.....	No	None.....	No.
Two; not licensed; fed to hogs and buried; no inspection.	No	No	None.....	No.
Three	No; not necessary.	No	One tannery, buying hides; two or three butchers, slaughtering animals.	No.
Two; not licensed; offal fed to pigs; no.	No	No	None.....	No.
Two; not licensed .....	.....	No	None.....	No.
None.....	.....	No	None.....	No.
None.....	.....	No	None.....	No.
Fourteen; yes; burned; no.	No	No	None.....	No.
Five; no; burned; no.	No	No	None.....	No.

TOWNSHIPS — *Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board.	Contagious diseases.
Pembroke	J. D. Deacon, M.D.; H. W. Perrett.	No	None.....
Ryde	S. Bridgeland, M.D.; W. Tingey.	Action is taken when complaint is made to Board.	None.....
Rainham	John Fry, M.D.; R. A. Havill.	Only when complaint is made	None.....
Rayside	No M. H. O.; Z. Regimbal.	No	None.....
Radcliffe and Raglan.....	J. E. A. Miller .....	.....	Diphtheria, 6 cases, 2 deaths.
Rolph, Buchanan and Wylie.	W. L. Gray, M.D.; F. McCarthy.	No; action taken only on complaint.	None.....
Ryerson.....	— Crawford, M.D.; E. Geddes.	No general sanitary inspection; action is only taken on complaint.	None.....
Rochester	R. F. Rorke, M.D.; S. Ducharme.	When complaints are made to the Board.	Scarlatina, a few cases; typhoid, 1 case; tuberculosis, 3 cases, 3 deaths.
Raleigh	S. N. Young, M.D.; H. E. Robinson.	Action taken when complaint is made.	Scarlatina, 30 cases, 1 death; diphtheria, 2 cases.
Ross	A. W. Mair, M.D.; Wm. Grant.	Yes; no; yes	Scarlatina, 7 cases, 1 death, diphtheria, 14 cases, 1 death; typhoid, 1 case.
Rawdon.....	W. A. Sargent, M.D.; Thomas McConnell.	The township is divided into four parts, under especial care of a member of the Board; chairman and M.H.O. have special supervision	Typhoid, 1 case; tuberculosis, 6 cases.

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
No occasion	Yes; good results	No	No
Yes; no hospital .....	.....	Yes	No; no
No	Cannot say	No	No
.....	.....	.....	No
No .....	.....	Yes	No
.....	.....	.....	No
No cases this year	Not required this year	Yes, if necessary	No; no
Houses placarded	Yes; results satisfactory ..	Yes	No
Yes; house placarded	Yes; don't know	Not usually	No; no
Yes; houses placarded, patients isolated as far as possible from the other members of the family; anti-septic precautions taken; no isolation hospital.	Yes; results have been very satisfactory.	No; directions are given by attending physicians.	No; no
Yes	Don't think it is used	Yes	No; no

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teacher and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Pembroke	Yes	Ordinary wells.....	No
Ryde	No	Wells	No; no.....
Rainham	No	Wells; from 10 to 25 feet	No
Rayside	No		No
Radcliffe and Raglan	No		No
Rolph, Buchanan and Wylie.	No		No; no.....
Ryerson	No	From natural springs ..	No; no.....
Rochester	No	Wells; from 12 to 18 feet	No
Raleigh	No	Wells; from 10 to 100 feet deep.	No; no tuberculosis reported.
Ross		Wells; 20 feet.....	No; don't know
Rawdon	No	Springs and wells.	No

TOWNSHIPS.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by an officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See Sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under the Public Health Act? State in detail the nature of the case and results of same.
Three; no.....	No	No	Slaughter houses....	No.
None.....	.....	No	None.....	No.
None licensed.....	No	No	None.....	No.
None.....	No	No	None.....	No.
None.....	.....	.....	None.....	No.
None.....	No	None.....	None.....	No.
None.....	No	No	None.....	No.
Two .....	.....	.....	.....	No.
One; no; burned; no.	No	No	None.....	No.
One; no; don't know.	No	No	None.....	No.
Three, kept in good condition; no licenses; cooked and fed to pigs; no.	No	No	None.....	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Rama	W. C. Gilchrist, M.D.; John Waldron.	Only when complaint is made to Board.	
Reach.....	John Park, M.D.; Wm. Spence.	Yes; special action taken when complaint is made.	Scarlatina, 2 cases; tuberculosis, 8 deaths.
Romney.....	W. H. Miller, M.D.; J. W. Hodgson.	General sanitary inspection.	None reported.....
Russell.....	F. M. Perris, M.D.; W. R. Craig.	Action taken when complaint is made.	None reported.....
Strong	—, Carmichael, M.D.; John Carter.	Only when complaint is made.	Typhoid, 5 cases.....
Sherbrooke.....	N. Hopkins, M.D.; Geo. Chalmers.	No; no; yes.	Diphtheria, 8 cases; typhoid, 2 cases; tuberculosis, 1 case, 1 death.
Sunnidale.....	Geo. Hunt, M.D.; T. F. Burrows.		Tuberculosis, 1 case, 1 death.
Saugeen.. ..	Geo. Veitch, M.D.; R. B. Fleming.	Cheese factories and slaughter houses are inspected.	Scarlatina, 4 cases, 1 death; typhoid, 6 cases, 1 death; tuberculosis, 7 cases, 3 deaths.
Sandwich, E.....	D. Beachard, M.D.; Maurice Renaud.		Diphtheria, 4 cases.....
Seneca	No M.H.O.; A. Williamson.	Yes; one general inspection, after which action is taken when complaint is made.	Typhoid, 3 cases, 1 death.
Stephenson.....	S. Bridgland, M. D.; Daniel Bain.		Diphtheria, 1 case; typhoid, 2 cases; tuberculosis, 1 case, 1 death.
Sombra	D. K. Stinson, M.D.; Orro Bishop.	Action taken only when complaint of nuisance is made.	Scarlatina, 4 cases; diphtheria, 50 cases, 5 deaths; typhoid, 12 cases, 1 death.
Stanley	M. N. V. Armstrong, M.D.; J. T. Cairns.	No.....	Scarlatina, 10 cases; typhoid, 3 cases; tuberculosis, 2 cases, 2 deaths

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Not required this year	Not used this year	Yes	No
Placarded promptly when reported.	Yes; favorable results have followed every case.	Yes; under supervision of M. H. O. or some member of the Board.	Yes; no.....
Yes, when any cases occur.	.....	Yes	No
Placard house; no hospital	Yes; in every case successful.	Yes	No
Yes; no hospital	No.	Yes	No.....
Yes; no.....	Yes; good results.....	No.....	No.....
Yes; by complete isolation.	Yes, when required; good results.	Yes	No.....
Isolation carried out under instructions of attending physician.	No cases.....	No; some cases by M. H. O.	No; no.....
House quarantined.....	No.....	Yes.	No; no.....
Yes; house placarded; no hospital.	No cases reported this year.	Yes; no.....	No.....
Yes; no hospital exists....	.....	No.	No.....
Yes; as far as possible in private houses; patients are confined to single apartment and door of apartment protected by a sheet saturated with corrosive solution.	Yes; it proves universally helpful when used early.	Yes.....	No; no.....
No.....	.....	No.....	No; no.....

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Rama	Yes.....	.....	No; no; no.....
Reach.....	Supplied to physicians ..	Wells; from 20 to 45 feet	No
Romney.....	Yes.....	Wells; 12 feet deep....	No; no.....
Russell.....	Yes.....	Wells; about 20 feet....	No
Strong	No.....	Wells, about 10 to 20 ft..	No.....
Sherbrooke.....	Yes.....	Wells	No; no.....
Sunnidale	Yes	Wells, 15 to 30 ft.....	.....
Saugeen	Supplied by the secretary of Board when asked for.	Wells, and Saugeen River	No; no cases reported in 1898.
Sandwich, E.....	No.....	Wells, from 10 to 18 ft ..	No; no; not used.....
Seneca .....	.....	Wells and springs.	No dairies; no inspection; no cases.
Stephenson.....	No.....	Wells and springs.....	No; no
Sombra.....	No.....	Cistern water largely used, but in some parts wells are mostly used.	No; no
Stanley.....	No.....	Wells, 15 to 20 ft.....	No; no

TOWNSHIPS—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 68, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
One; not licensed ..	None removed	No	None.	No.
Four; not licensed, but are kept in sanitary condition.	No	No	None.	No.
Two; no	No	One being constructed.	None.	No.
Three; no; no	No	No	None.	No.
None.	No.	No.	None.	No.
None.	No.	No.	None.	No.
1.	None.	No.	None.	No.
1 near Pt. Elgin and 5 in township; licensed.	No; removed by householder.	No.	None.	No.
5; yes; buried and fed to hogs; only on complaint.	No.	No; drained by ditches.	None.	No.
None.	Removed by householder.	No.	None.	No.
1; no.	No.	No.	None.	No.
2; no license; don't know.	No.	No.	None.	No.
None.	No.	No.	None.	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Sandwich, S.	—, Cruikshank, M.D.; John Monaghan.	No; no; only on complaint.	Diphtheria, 6 cases; tuberculosis, 1 case, 1 death.
St. Vincent	F. H. Heming, M.D.; G. G. Albray.	No regular system of inspection by sanitary officer, but any cases reported receive prompt attention.	Scarlatina, 5 cases; typhoid, 2 cases.
Storrington.....	No M. H. O.; Alex. Ritchie.	.....	.....
Sherborne, etc	No M. H. O.; J. B. Shrigley.	No.	None.....
Stafford	Geo. E. Josephs, M.D.; Jno. Kidd.	Only when complaint is made.	Diphtheria, 6 cases, 1 death; typhoid, 1 case.
Sheffield	C. D. Clarke, M.D.; Jas. Aylsworth.	Action taken only when complaint is made.	Diphtheria, 3 cases 1 death; tuberculosis, 3 cases 3 deaths.
Sarnia, ...	T. G. Johnston, M.D.; M. Lowrie.	Upon complaint of nuisance.	Scarlatina, 3 cases, 2 deaths; diphtheria, 2 cases, 1 death; tuberculosis, 2 cases, 2 deaths.
Sandfield.....	—, Berry, M.D.; W. A. Hare.	No; no complaints made	None.....
Stisted	No M. H. O.; Thos Lakeman.	.....	None.....
Seugog	No M. H. O.; John Fry.	Only when complaint is made.	None.....
Sydenham.....	A. C. Sloane, M.D.; James Cannon.	Action taken when nuisance is complained of.	Scarlatina, a number of cases; typhoid, 6 cases, 1 death; tuberculosis, 1 death.
Springer	No M. H. O.; O. Lafrance.	No inspection made unless requested.	None.....
Sebastopol	No M. H. O.; C. Walther.	No.....	None.....
Sarawak.....	No M. H. O.; John McKenzie.	Nct this year; only on complaint.	Typhoid, 1 case, 1 death.
Southwold.....	Duncan Smith, M.D.; M. Campbell.	By Board of Health.....	Diphtheria, 3 cases, 1 death; tuberculosis, 9 cases, 9 deaths.

TOWNSHIPS.—Continued.

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from every school children each year?
Houses placarded and inmates not allowed to leave the house.	Yes; with good results....	Yes	No; no.....
No.....	No.....	Yes	The public school trustees are notified each year to attend to school premises and place the same in a proper sanitary condition.
.....	.....	No.....	No.....
No occasion to isolate....	No diphtheria	No.....	No.....
No person allowed to enter the house.	Yes; it was not used in the case that ended fatally.	Under supervision of attending physician,	No.....
No hospital; physician in attendance isolate patient in dwelling.	Yes; good results.....	No; no.....	.....
Usual methods employed by physician in attendance.	.....	Attending physician looks after disinfection.	No.....
.....	No.....	.....	No.....
.....	No.....	Yes	No.....
No.....	.....	No.....	No.....
Yes; isolated in homes only.	No.....	Yes	No; no.....
No hospital; isolation would be carried out if necessary.	Don't know.....	.....	No inspection; certificate of vaccination has not been required so far.
No.....	No.....	No.....	No.....
Yes; by isolation of house; no hospital.	No.....	Yes	Yes
No.....	No.....	Yes	Yes.....

TOWNSHIPS.—*Continued,*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supplied used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Sandwich, S.....	Yes.....	Surface wells, from 12 to 16 ft., and artesian wells, from 90 to 110 ft.	No; no.....
St. Vincent.....	Yes.....	Generally wells.....	No; no.....
Storrington.....	No.....		
Sherborne, etc.....	No.....		None.....
Stafford.....			No; no.....
Sheffield.....	Yes; to physicians....	Wells, drilled in rock 20 ft.	No; no.....
Sarnia.....	Yes.....	Wells.....	Yes.....
Sandfield.....		Spring creeks and wells, about 15 ft.	No; no; no.....
Stisted.....	No.....	Wells.....	No.....
Scugog.....	No.....	Wells, about 30 ft.....	No inspection.....
Sydenham.....	Yes.....	Wells, from 9 to 30 ft.....	No; no.....
Springer.....	Not unless requested by teacher or M.H.O.	Wells, generally from 6 to 10 ft	No.....
Sebastopol.....	No.....	Springs and wells.....	No.....
Sarawak.....	Yes.....	Wells, 20 ft. deep.....	Yes; no.....
Southwold.....	No.....	Wells.....	Yes.....

TOWNSHIPS.—*Continued*

How many slaughter-houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what portion of houses of whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, any results of same.
3; no; offal fed to hogs; no.	No.	No.	None.	No.
1; inspected several times during the year by the sanitary inspector; no inspection of carcasses.	No.	No.	None.	No.
None.	None.	No.	None.	No.
None.	No.	No.	None.	No.
1; no; don't know.	No.	No.	No.	No.
11; inspected at intervals; don't know; no.	No.	No.	Slaughtering of animals.	No.
None.	None.	No.	None.	No.
None.	None.	No.	None.	No.
None.	None.	None.	None.	No.
None.	No.	None.	None.	No.
None.	No.	No.	None.	No.
1; not licensed; good condition; no inspection of carcasses by Board.	No.	No.	One.	No.
5; no; boiled; no.	No.	No.	None.	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Somerville.....	R. S. Frost, M.D.; Samuel Suddaby.	.....	None reported.....
Scarboro'.....	O. Sisley, M.D.; T. Crawford.	Action taken only when complaint is made to Board.	Scarlatina, 8 cases; diphtheria, 4 cases; typhoid, 7 cases; tuberculosis, 4 cases, 1 death.
Sherbrooke, S.....	W. Kilborne, M.D.; Henry Rigney.	No; action taken only when complaint is made to Board.	None.....
Stephen.....	— Rivers, M.D.; C. Prouty.	General inspection.....	Diphtheria, about 20 cases, 3 deaths; typhoid, 3 cases; tuberculosis, 4 cases, 4 deaths
Stanhope.....	No M. H. O.; Wm. Cooper.	No; yes.....	Tuberculosis, 1 case, 1 death.
Sullivan.....	H. G. Pickard, M.D.; A. Stephen.	Action taken when complaint is made to Board.	Diphtheria, 6 cases; tuberculosis, 4 cases, 4 deaths.
Stamford.....	John M. Dee, M.D.; F. A. Hutt.	Yes; yes; and also when complaints are made to Board.	Scarlatina, 6 cases; tuberculosis, 1 death.
Sophiasburg.....	John Cryan, M.D.; C. H. Wright.	.....	None.....
Tay.....	No M. H. O.; S. L. Montgomery.	Action taken when attention of Board is called to it.	Tuberculosis, 7 cases ...
Tecumseth.....	No M. H. O.; Henry Stone.	.....	None.....
Thessalon.....	No M. H. O.; J. E. Clinton.	No; action taken only when complaint is made to Board.	None.....
Turnberry.....	C. A. Toole, M.D.; Jno. Burgess.	Action taken when complaint is made to Board.	Tuberculosis, 1 case, 1 death.

TOWNSHIPS.—Continued

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Premises placarded, no isolation hospital.	Have not heard of it being used.	Yes; generally under supervision of M.H.O.	No; no.....
Yes; houses placarded and inmates quarantined.	No.....	No.....	Yes; no.....
No; isolation carried out..	No.....	No.....	No; no.....
Not allowed to mingle with the public.	Yes; with favorable results.....	Yes.....	.....
Houses placarded; no isolation hospital.	Don't know.....	Yes.....	No; no.....
Yes; all inmates of house kept from mingling with general public.	No.....	Yes.....	No; but the trustees have to certify that they have complied with the health by-laws of the township.
No; by placarding only; no isolation hospital.	No; no cases.....	No; not possible in some cases.	No; no.....
.....	No cases.....	When necessary.....	No.....
No; when a case occurs the house is placarded; no isolation hospital.	No.....	Yes.....	No; no.....
None.....	None.....	Yes.....	No.....
No; placard house; patient isolated from other members of family.	No occasion.....	No.....	No; no.....
When ordered by M. H. O. only; no hospital, placard houses and had families isolated as much as possible.	No necessity.....	Yes; under supervision of M.H.O.	No; no.....

TOWNSHIPS.—*Continued*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculousness rep., and state whether the tuberculin test has been used.
Somerville	Yes.....	Principally wells, from 10 to 30 ft	No; no dairies.....
Scarboro'	Yes.....	Wells, 40 ft.....	No; yes, and tuberculin test used.
Sherbrooke, S.....	No.....	Wells, about 15 ft.....	No inspection; no test..
Stephen		Wells	No; no; no.....
Stanhope	No.....	Wells	No; no.....
Sullivan	Yes.....	Mostly wells, about 20 ft.	No large dairies.....
Stamford	Not to teachers.....	From wells, 25 ft. deep..	No; yes; yes
Sophiasburg	No.....	Wells and springs, 20 ft.	No.....
Tay	No	Wells; 25 ft.....	No; no occasion.....
Tecumseth	Yes	Wells; 18 to 50 ft	Don't know
Thessalon	No	Wells; about 14 ft.....	No; no; the tuberculin test has never been tried.
Turnberry	None have been required	Wells; 15 to 30 ft	No; none reported

TOWNSHIPS.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night-soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses of whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 68, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, any results of same.
None.....	Each householder attends to his own; Board interferes only when complaint is made.	No.....	None.....	No.
9; yes; fed to pigs; no.	No.....	No.....		No.
None.....	No.....	No.....	None.....	No.
2; not licensed; not sufficient inspection			None.....	No.
None.....	No.....	No.....	None.....	No.
1; yes; no.....		No.....	One slaughter house; one tannery.	No.
5; kept in a sanitary condition; fed to hogs; no.	No.....	No.....	None.....	No.
1; no.....	No.....	No.....	None.....	No.
Three; no; generally fed to hogs.	No.....	None.....	None.....	No.
One; cannot say.....	No.....	No.....	None.....	No.
One; no; fed to hogs.	No.....	No.....	None.....	No.
Only 3; not licensed; don't know how offal is disposed of; no systematic inspection.	No.....	No.....	None.....	No.

TOWNSHIPS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Tossorontio	J. J. Williams, M.D.; Thomas Irwin.	Action taken when complaint is made to Board	None
Townsend	A. Bowlby, M.D.; S. Cunningham.	No	Scarlatina, 1 case, 1 death; diphtheria, 2 cases, 1 death; tuberculosis, 1 case, 1 death.
Tyendinaga	H. O. Lanfear, M.D.; A. R. Randall.	No; no; only when complaint is made to the Board.	Tuberculosis, 1 case, 1 death.
Tiny	Geo. Bowman, M. D.; W. H. Clute.	No; only on complaint.	.....
Tilbury, N	J. A. Lemire, M.D; J. A. Tremblay.	Action only when complaint is made.	Diphtheria, 3 cases; tuberculosis, 2.
Tuckersmith.....	No M. H. O.; A. G. Smillie.	Action taken only when complaint is made to Board.	Scarlatina, 3 cases, 1 death; tuberculosis, 1 case, 1 death.
Thurlow	D. W. Faulkner, M D.; Anson Lotta	No; no; action only taken when complaint is made.	Scarlatina, 1 case, 1 death; Tuberculosis, 4 cases, 4 deaths.
Tilbury, E.....	C. B. Oliver, M.D.; D. A. Farquharson.	Action taken upon complaint or report of any member of Board.	Scarlatina, 15 cases; diphtheria, 8 cases.
Toronto	M. Sutton, M.D.; C. H. Gill.	Yes; yes	Scarlatina, 9 cases; diphtheria, 5 cases, 1 death; Typhoid, 10 cases; tuberculosis. 2 deaths.
Usborne.....	A. K. Ferguson, M.D.; Francis Morley.	.....	Scarlatina, 13 cases, 1 death; typhoid, 10 cases, 2 deaths; tuberculosis, 12 cases, 4 deaths.
Uxbridge	R. E. Darling, M.D.; S. A. Flumerfelt.	Only on complaint to the Board.	Scarlatina, 3 cases; typhoid, 2 cases, 1 death; tuberculosis, 5 cases, 5 deaths.

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Isolated in their homes....	No cases	Yes	No; no
No	Don't know	Yes	No
Yes; patients are isolated in their homes.	None used.....	No	No; no
No	No diphtheria reported....	No	No; no
Yes; in private house .....	.....	Yes	Yes.
.....			
No; house is generally placarded.	Don't know	Don't know	No; no
Yes; house placarded and no one allowed to visit the inmates until after thorough disinfection.	Yes; has been used.....	Yes	No; no
As well as possible.....	Yes.....	In most cases it is	Yes; no
Yes; physician in attendance under instructions of Board.	Yes; none since last report.	No; unless requested to do so by attending physician.	Yes; no
No isolation hospital, but all cases isolated by M. H.O.	No	Yes; under direction of M.H.O.	No

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Tossorontio	No	Wells; from to 60 ft.	No; no
Townsend	No	Wells	No
Tyendinaga	No	Springs and wells; for 6 to 80 ft.	No; have not heard of any; no.
Tiny	No	Wells; from 10 to 100 ft. deep.	No
Tilbury, N.	Yes	Wells	No
Tuckersmith .....	.....	.....	No systematic inspection is practiced, but some tests have been made.
Thurlow	Don't think so.....	Wells; from 10 to 23 ft.	No
Tilbury, E	No	Surface wells to some extent, but now largely wells from 90 to 150 ft.	No; no
Toronto	To M.H.O. only.....	Wells; 8 to 70 ft	No
Usborne.....	Yes.....	Wells; 20 to 40 ft	No; yes; yes.....
Uxbridge	Not generally	Wells; from 12 to 100 ft.	No; no

TOWNSHIPS.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what portion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec 63, Public Health Act). How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, and results of same.
One; no license . . .	No	No	None	No
Don't know; no license.	No	No	None	No
Eight to ten; no; cannot say; no.	No	No	Slaughter houses not licensed.	No
One; no		None	None	No
None			None	No
Four; not licensed, but are kept in good sanitary condition, under the supervision of the Board.				No
Six; no; offal is fed to hogs; no inspection of carcasses.	No; no; no.	None	None	No
Don't know exactly, 3 or 4; all kept in sanitary condition.	No			No
Seven; no; buried or fed to hogs; no.				No
Two; burned or buried; no.	No		None	No
One; not licensed but inspected; offal fed to hogs.	No	No		No

TOWNSHIPS.—*Continued*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Vespra	—Wallum, M.D.; Geo Sneath.	Action only taken when complaint is made to Board.	Tuberculosis, 5 cases, 5 deaths.
Verulam	C. E. Bonnell, M.D.; G. W. Taylor.	Inspection is made when complaints are received	Diphtheria, 2 cases; typhoid, 4 cases.
Williams, E.	John Gunn, M.D.; David Wyllie.	No sanitary inspection; neither has there been any complaint of nuisance.	Scarlatina, 1 death; tuberculosis, 5 deaths.
Wellesley	Wm. Morton, M.D.; P. F. Schummer.	.....	Scarlatina, 68 cases; measles, 44 cases; typhoid, 7 cases.
Waterloo.....	H. G. Roberts, M.D.; G. A. Tilt.	Annual inspection, and when complaint is made.	Diphtheria, 30 cases; typhoid, 10 cases; tuberculosis, 4 cases.
Westminster.	G. S. Rutledge, M.D.; J. H. Anderson.	Action taken when complaints are made.	Diphtheria, 2 cases
Williamsburg	No M.H.O.; Geo. Lane.	Action taken when complaint of nuisance is made to Board.	Scarlatina, 6 cases; diphtheria, 1 case; tuberculosis, 12 cases, 8 deaths.
Wainfleet'	W. B. Hopkins, M.D.; J. H. Henderson.	Only when complaints are made.	Scarlatina, several cases.
Wilmot	J. A. Buttler, M.D.; F. Holwell.	Yes; repeated every spring and when complaints of nuisances are made.	Scarlatina, 12 cases, 1 death; diphtheria, 5 cases; typhoid, 2 cases.
Whitchurch	S. L. Freel, M.D.; C. Richardson, M.D.; J. C. Lundy.	Action taken only when complaint is made.	Scarlatina, 3 cases; diphtheria, 2 cases, 1 death; typhoid, 1 case.

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried on? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes; houses placarded and isolated; no isolation hospital.	None used at present.....	Yes	No
Yes; by having patient isolated and an officer appointed by the M. H. O. to see that patient and inmates are supplied with the necessary food, etc.	Only been two cases; anti-toxine used in both cases with good results.	Yes	No; nor does it require certificates that vaccination has been performed from new school children each year; M. H.O. have urged the Board to do so, but as yet no action is taken.
No	No occasion to use it.....	.....	No
In some cases they are taken to our county hospital (Berlin).	No	Some times.....	Yes, in regard to wells and premises; no.
Yes; by having premises quarantined and supplying wants by a messenger.	Yes; with good results....	Yes ..	Yes; no.....
No hospitals; infected houses are placarded.	No.....	Yes	Yes; no
No	Don't know ..	Yes	No.....
No; no	Yes; almost always successful if not too late.	No.....	No; no
Yes; when possible confining inmates to house; placarding house.	Yes; results satisfactory..	All cases reported on supervision by an officer of the Board.	No; no
House placarded; family confined to house; an officer appointed to look after the inmates.	Don't know	Yes; by a member of Board or physician in attendance.	No.....

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M.H.O. of contagious diseases supplied?	(Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Vespra	No; no	Wells; from 5 to 150 ft	No; no
Verulam	Yes.....	From a running spring..	.....
Williams, E.....	No	Wells; from 10 to 20 ft.	No
Wellesley	To physicians only.....	Wells; about 25 ft	No; yes.....
Waterloo .....	.....	Deep wells.....	Yes; no.....
Westminster	No.....	Wells; 10 to 80 ft.	Yes.....
Williamsbur	No.....	Wells; from 6 to 25 ft...	No; no
Wainfleet	No.....	Wells and cisterns.....	No; no
Wilmot	No.....	Wells; 20 to 25 ft.....	No; several suspected cases have been tested by tuberculin, results negative; one slaughtered animal was found to be affected; carcass destroyed.
Whitchurch	No.....	Wells; from 15 to 60 ft..	Not by Board; don't know.

TOWNSHIPS.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in goods sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
One; no	No	No	None	No.
None		No	None	No.
Two; no				No.
Six; kept in sanitary condition.	No	No	None	No.
13; yes; buried; no			None	No.
Three; yes; fed to hogs on premises; no.	No	No	None	No.
Four; yes	No	No	None	No.
None	No	No	None	No.
Three; buried; no	No	No	None	No.
Three; offal cooked and fed to hogs.	No	None	None	No.

TOWNSHIPS.—*Continued.*

Name of Municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board.	Contagious diseases.
Wallace	L. W. Thompson, M.D.; R. G. Roberts.	On complaint only.....	Scarlatina, 6 cases, 1 death; diphtheria, 1 case, 1 death; typhoid, 1 case; tuberculosis, 1 case, 1 death.
Woolwich	Wm. B. Robinson, M.D.; J. L. Wideman.	.....	Typhoid, a few cases, no deaths; tuberculosis, 3 deaths.
Widdifield	J. B. Carruthers, M.D.; C. W. Thompson.	No; no; yrs.....	None
Woodhouse	— Hamilton, M.D.; Frank Bowlby.	Yes; action taken when complaint is made.	.....
Wanwanosh, E.....	John McAsh, M.D.; P. Porterfield.	Action taken only when complaint is made to Board.	General health of the township has been good.
Watt	No M.H.O.; Wm. Sword	Yes	Tuberculosis, 1 case, 1 death.
Willoughby	M. K. Colver, M.D.; H. H. Bean.	Sanitary inspection is made when complaint of nuisance is received.	Scarlatina, 7 cases, 1 death; typhoid, 1 case; tuberculosis, 1 case, 1 death.
Whitby	F. A. Dales, M.D.; D. Halliday.	Inspection usually made in May and upon complaint.	Tuberculosis, 2 cases, 2 deaths.
Whitby, E	No M. H. O.; Wm. Purves.	Action taken when complaint is made to Board	.....
Wilberforce and N. Algona .	John Channon house, M.D.; Geo. Stone.	No	Scarlatina, 3 cases; tuberculosis, 1 case, 1 death.
Winchester.....	Humphrey Errett, M.D.; Geo. Quart.	When complaint is made to the Board.	Diphtheria, 1 case; tuberculosis, 7 cases.

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
The usual isolation; no hospital.	Anti-toxine used with favorable results.	No.....	No.....
Yes; no hospital	Yes; physicians say results are satisfactory.	Yes .....	.....
No occasion; none.....	Never had any occasion to use it.	No occasion	No; no
No isolation hospital exists; houses are placarded.	Partly in use'.....	No.....	No.....
.....			
Yes; no	Don't know	Yes	No.....
No hospital; houses placarded.	Yes; results satisfactory..	Yes	No; no
Have been remarkable free from contagious disease.	No.....	No occasion	Yes; no
No.....	No.....	No.....	No; no
No.....	No	No	No.....
Inmates of houses not allowed to mingle with the public.	Has been used with good results.	By physician in attendance.	No

TOWNSHIPS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Wallace.....	Yes	Wells; 12 to 40 ft.	No systematic inspection; no cases of tuberculosis.
Woolwich .....	.....	Wells; 10 to 40 ft.; water good.	Yes
Widdifield	No.....	Spring creeks.....	No.....
Woodhouse.....	Yes	Wells; about 50 ft.....	No; yes; tuberculin test used once.
Wanwanosh, E.....	.....	.....	.....
Watt	Yes.....	Wells	No.....
Willoughby	No.....	Wells; 15 ft.	No; no
Whitby	No.....	Wells; about 30 ft	No; several tests have been made by Dominion inspectors; few cases found.
Whitby, E	No.....	Wells	No; yes.....
Wilberforce and N. Algona ..	No.....	Wells	No.....
Winchester.....	No.....	From wells; 20 to 30 ft.	No; no

TOWNSHIPS.—*Continued*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is the cost calculated?	Is there a public sewage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, any results of same.
One; offal buried; no inspection.	No system.....	No.....	None	No.
One; kept in good sanitary condition.	Yes	Only three houses that have sewage system.	None	No.
Two; no; fed to hogs; no.	No.....	None.....	None	No.
Two; yes; fed to hogs; no.	No.....	No.....	None	No.
.....				
None; no	No.....	No.....	None	No.
Four; no	No.	No.....	No; other than slaughter houses.	No.
Three; not licensed; offal boiled and fed to hogs; no.	Formerly were removed by householder.	No.....	None	No.
Three; no; buried; no.	No.....	No.....	No	No.
No.....	No.....	No.....	No	No.
Three; fed to swine	Yes .....	.....	.....	.....

TOWNSHIPS.—*Concluded*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Wollaston.....	E. N. Wagner, M.D.; W. H. Nugent.	No; no action taken only when Board is notified.	Typhoid, 3 cases.....
Walsingham, S.....	Geo. Stewart, M.D.; J. C. Thomas.	No	Typhoid, 2 cases, 1 death.
Yonge and E. Front.....	J. W. Lane, M.D.; John F. Kelly.	When complaints are made to Board.	Typhoid, 1 case; tuberculosis, 6 deaths
Yarmouth.....	—, Sanderson, M.D.; K. W. McKay.	Sanitary inspector visits all slaughter houses and attends to all complaints made to him in writing	None
York.....	T. J. Page, M.D.; W. A. Clarke.	General sanitary inspection once monthly, report by Sanitary Inspector and M.H.O.	Smallpox, 1 case; scarlatina, 29 cases, 1 death; diphtheria, 16 cases, 1 death; typhoid, 4 cases, 1 death; tuberculosis, 5 cases, 5 deaths.
Zorra, E.....	A. N. Hotson, M.D.; Jas. Anderson.	.....	Diphtheria, 3 cases; typhoid, 6 cases, 1 death
Zone	H. D. Graham, M.D.; Henry Osborne.	Inspections are made by order of the Board.	Typhoid, 1 case.....

TOWNSHIPS — *Concluded.*

Is isolation of contagious diseases systematically carried out? State methods adopted, and whether any isolation hospital exists.	Is Diphtheria Anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
No; suitable methods to meet requirements as far as practicable; no hospital.	Not in common use; have had no occasion to use it.	Yes	No.
Yes; no hospital	Yes; with good results	Yes .....	.....
No; isolated in houses as well as possible; no hospital.	No occasion to use it	No	No.....
No record	No record	Yes; when M.H.O. has notice and no regular physician in attendance.	No; no
Yes; under supervision of M. H. O.; no isolation hospital.	.....	Yes; by M.H.O	Yes; no
Yes; ordinary methods in private houses; no hospital.	It is becoming more generally used, with more satisfaction; 2 cases in one house, the first one refused to have anti-toxine injected, the other was treated with it and made a far better recovery.	Sometimes an officer supervises.	Yes; no
No.....	.....	None.....	.....

TOWNSHIPS.—*Concluded.*

Name of municipality.	Are forms for notification by teacher and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Wollaston	No	Wells, generally	No; no
Walsingham, S.	No	Don't know	No
Yonge and E. Front	Yes	Wells; 10 to 20 ft.	No
Yarmouth	Not by Board of Health .....	.....	No
York	Yes	Wells; about 50 ft.	No
Zorra, E	Yes	Wells; 15 to 50 ft	No
Zone	M. H. O. use them	Wells .....	.....

TOWNSHIPS.—*Concluded.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost regulated?	Is there a public sewerage system? If so, what portion of houses to whole is connected with public sewers?	State No. and kind of noxious trade*. (See sec. 63, Public Health Act). How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, and results of same.
None.....	No.....	No.....	None	No.
None.....	No.....	No.....	None	No.
Two; not licensed..	No.....	No.....	None	No.
.....				
About 20.....	.....	.....	One glue and refining factory, 1 pig-gery, 1 varnish factory, by permit of tp. council.	No.
Four: yes; burned or buried; no.	.....	.....	.....	No.
Two; no license; offal fed to hogs.	.....	.....	.....	.....

VILLAGES

Name of municipality.	Name of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Acton	A. S. Elliott, M.D.; T. Moore.	General sanitary inspection.	Diphtheria, 1 case
Ailsa Craig	John Gunn, M.D.; E. B. Smith.	Inspection on complaint.	Scarlatina, 1 death
Alexandria	D. D. McDonald, M.D.; A. L. Smith.	Yes	Diphtheria, 2 cases; typhoid, 2 cases; tuberculosis, 4 cases, 4 deaths.
Alvinston	A. MacKinnon, M. D.; R. Code.	Only when complaint is made.	Scarlatina, about 20 cases; typhoid, 4 cases; tuberculosis, 2 cases.
Arkona	Geo. R. Watson, M.D.; T. W. Trimble.	Once a year	Scarlatina, 12 cases
Brighton	A. B. H. Dean, M.D.; J. H. Morrow.	Only on complaint to Board.	Tuberculosis, 1 case.....
Brussels	J. A. McNaughton, M. D.; T. S. Scott.	Yes; yes; also on complaint.	Typhoid, 2 cases.....
Beamsville	W. A. Confort, M.D.; Chas. E. Reggins.	Once a year and on complaint.	.....
Bridgeburg	J. R. Mencke, M.D.; H. Emrick.	Once a year and on complaint.	Diphtheria, 2 cases; typhoid, 1 case.
Bayfield	C. Sheppard, M.D.; H. W. Erwin.	Inspection once a year, and when complaint is made.	Typhoid, 1 case; tuberculosis, 1 case, 1 death.

VILLAGES.—*Continued*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists	Is diphtheria anti toxin in common use by physicians? Give results of treatment in all cases where possible	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Houses are placarded	Used by Dr. McDonald...	No	No; no
No; some physicians fail in making reports.	No	No	No; no
Yes	Yes; but as other remedies were used it is impossible to give definite results.	Yes	Yes; no
No; placard house	No cases	No	No; no
Yes; quarantined at residence; no hospital.	Was used in one family with good results.	Yes	No; no
Yes; isolated in residence ..	No	Yes	Health Officer does frequently; no.
Yes; by placarding houses.	None here	Yes	Yes; yes
No contagious diseases ..	No occasion for using it ...	No cause for it	Inspect schools once a year; no certificate required.
Usually placarded; none ..	Yes	Yes	No; no
Yes	No cases	No	No; no

VILLAGES — *Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Acton	Yes	Wells; from 12 to 30 ft..	No; none
Ailsa Craig	No	Wells: from 4 to 20 ft..	No; none reported; no..
Alexandria .....	.....	Waterworks and wells; depth, 20 to 30 ft.	No; no; no.....
Alvinston	No	Wells; 8 to 10 ft.....	No
Arkona	No	Wells; 12 ft. deep; gravel stratum.	No inspection; no tuberculosis as far as is known; one test, negative result.
Brighton	No	Wells	No; no
Brussels	Yes	Wells; 15 to 30 ft.; out of lime stone rock.	No; no; no.....
Beamsville	Yes	Waterworks and wells...	No
Bridgeburg	No	Wells; 10 to 50 ft.....	No; no
Bayfield	No	Wells	No; no

VILLAGES.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades (See sec. 68, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
None; all outside the village.	None	None	No	No.
None	Yes; night soil is put on land and ploughed under each morning; contract price for removal 43c per vault.	No	None	No.
None	Yes; costs 50c. per bbl.; paid by householder.	No	Two tanneries	Defective drainage case adjourned and done away with. Two cheese factories disposed of in similar manner.
One; no license; kept in sanitary condition; no inspection of carcasses.	No	No	None	No.
None		No	None	Yes; one butcher sold a carcass pronounced cancerous, was tried, convicted and sent to gaol for 3 months.
None	No	No	None	No.
None	Yes	No	None	No.
None	No; removed by householder.	No	None	No.
None	No	No	None	No.
One; no.	No	No	None	No.

VILLAGES.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Beeton	D. J. Dunn, M.D.; Jos. Wright.	Yes, and when complaints are made.	Tuberculosis. 1 case
Belle River	Wm. Anderson, M.D.; D. Dumouchelle.	Action taken only when complaint is made.	.....
Burlington	A. H. Speers, M. D.; James Allan.	Sanitary inspection once a year, and also when complaint is made.	Typhoid, 17 cases. 1 death; tuberculosis, 1 case.
Beaverton	A. Grant, M.D.; C. A. Patterson.	Yes; twice a year.	Tuberculosis. 2 cases, 2 deaths.
Bolton	D. Bonnar, M.D.; John McDonald.	General inspection at intervals.	Diphtheria, 1 case
Bath	H. S. Northmore, M.D.; Max Robinson.	Yes, at intervals	Scarlatina, 1 case; diphtheria, 2 cases.
Burk's Falls	Wm. Crawford, M. D.; E. Bezett.	Action taken by M.H.O. when complaints are made; annual inspection by S.I.	Scarlatina. 5 cases; typhoid, 3 cases.
Bobcaygeon	C. E. Bonnell, M. D.; Chas. S. Stewart.	Sanitary inspector keeps a general oversight.	Typhoid, 4 cases
Chesterville	No M. H. O.; Mileo Knowland.	Yes; repeated at intervals.	Typhoid, 1 case
Cardinal	Duncan Gow, M. D.; James Covil.	Yes; spring and fall...	Tuberculosis, 1 case

VILLAGES — *Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes	Yes .....	.....	No; no
Houses placarded; no hospital.	No occasion to use it.	Yes	No
Houses placarded	No cases of diphtheria	No; instructions given by medical attendant.	No
Yes, as far as possible by confining the inmates to the house where the disease exists	No	Yes	No
Yes; patients confined in a room, no communication allowed with any member of the family; no hospital.	Yes, when necessary	Generally by physicians in attendance or M.H. O. when necessary.	No; no
Yes; houses placarded and inmates isolated.	Yes; in one family parents had diphtheria. Antitoxine was used with good results. Two children were immunized; neither developed any symptoms.	Yes	No
Yes; houses quarantined.	Yes	Yes	No
Isolation and the house placarded.	Not yet used.	Yes	No
Yes; by confining patient to one room, no hospital.	No cases	Yes	Yes; no
Isolated in their own homes	No diphtheria	Under direction of M. H.O.	No; no

VILLAGES.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M.H.O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Beeton	Yes	Wells; about 14 ft.....	No; no.....
Belle River	Yes	Wells; about 12 ft.....	No; no.....
Burlington	No	Wells; about 30 to 35 ft.....	No; no tuberculosis
Beaverton	No	Wells	No; no.....
Bolton	No	Wells; about 16 ft.....	No
Bath	No	Principally from Bay Quinte.	None
Burk's Falls	No	Wells; about 20 ft.....	No
Bobcaygeon	No	Springs and wells	No; no
Chesterville	No	Wells; about 20 feet.....	No; no; not used
Cardinal	No	St. Lawrence River.....	No

VILLAGES.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
One; no license; no	No	No		No.
None	No	No	None	No.
None	No	No	None	No.
None	Yes; done at the expense of owner.	No	None	No.
Three slaughter houses; not licensed; under a by-law of village, upon conviction of any breach of provisions are liable to a fine of \$5.00; offal cooked and fed to swine.	Farmers and others remove night soil.	No	None	No.
Two; offal goes principally fed to pigs.	Yes; under inspection of M.H.O.	No	None	No.
None	No	No	None	No.
Three; erected by permission of Board; fed chiefly to hogs.	No	No	None	No.
One; not licensed, but kept in good sanitary condition; no inspection of carcasses.	No; work of this kind is done by private parties.	No	None	
None	No	No	None	No.

VILLAGES.—*Continued*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Cayuga	Wm. Kerr, M.D.; E. C. Campbell.	Yes; repeated at intervals, both by order of Board and when complaint is made.	Tuberculosis, 1 case; typhoid, 2 cases.
Chippawa	Andrew Grey, M. D.; Wm. Greenwood.	Sanitary inspection once a year.	None reported.....
Colborne	N. E. Mallory, M. D.; Geo. Keys.	Yes; no: also when complaints are made.	Scarlatina, 6 cases; typhoid, 6 cases; measles, 10 cases.
Caledonia	W. J. Burns, M. D.; James Old.	When complaint is made.	None
Chesley	Geo. Cooke, M.D.; Jas. McNeil.	Yes; yes	Scarlatina, 1 case
Creemore	— Dack, M.D.; A. H. Watson.	Yes; yes; twice each year.	Scarlatina, 1 case
Casselman	No M.H.O.; J. A. Ridell.	Only when complaint is made.	Diphtheria, 5 cases, 2 deaths; typhoid, 7 cases.
Clifford	H. Ross, M.D.; R. E. Bigger.	General inspection twice a year, and when complaints are made.	Scarlatina, 1 case; diphtheria, 1 case; typhoid, 2 cases.
Dunalk	Jas. McWilliam, M.D.; W. J. Wardell.	Yes; yes	Diphtheria, 1 case
Dunnville	N. Hopkins, M.D.; J. W. Holmes.	Every spring, and when considered necessary, or when complaint is made.	Diphtheria, 6 cases; typhoid, 4 cases.
Delhi	R. B. Wells, M. D.; Roger Crysler.	Yes; yes; also action taken by Board on complaint.	Scarlatina, 2 cases; typhoid, 1 case; tuberculosis, 2 cases, 2 deaths.

VILLAGES.—*Continued.*

Is isolation of contagious diseases systematically carried out? State method adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes; isolated at their homes; no hospital.	Yes; successful in all cases where it has been used.	Yes	No; no
No occasion	No diphtheria	No	No; no
Yes; residence placarded, and special constable placed in charge	No	Yes	No; no
No	Yes	No	No; no
Yes; complete isolation of each dwelling, and disinfection of each occupant before being allowed to mingle with the public.	Have had no diphtheria for some years	Yes	Yes; no
Yes .....	.....	Yes	Yes; no
Yes; no hospital	Used in 3 cases, with good results.	Yes	No
No hospital; physician isolates patients.	Not used, as very few cases have occurred.	No; medical attendant looks after it.	No; no
Yes; house placarded; ingress and egress strictly prohibited; no hospital.	No	Yes	Yes; no certificate required.
Patients are isolated at home.	Yes; physicians are well pleased with anti-toxine, and report favorable in all cases.	Yes	No
Isolation is carried out as far as possible.	Anti-toxine used in all cases; treatment thus far very satisfactory.	Under M. H. O	Yes; no

VILLAGES.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Cayuga	No	Cistern and very few wells.	No; one known case; no test applied.
Chippawa	No	Wells; from 14 to 20 ft.	No
Colborne	No	Wells; 12 ft.	No no
Caledonia	Yes	Wells; 25 to 50 ft.	No; no
Chesley	Yes	Wells; from 10 to 40 ft.	None
Creemore	Yes	Wells; about 12 ft.	None
Casselman	No		No
Clifford	Yes	Wells; 20 to 40 ft.	No
Dundalk	Yes	Wells; usual depth 25 ft.	No; no cases of tuberculosis.
Dunnville	Yes	Wells; about 12 ft. deep.	No
Delhi	No	Wells; about 20 ft.	No

VILLAGES.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 68, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
One; no; no	No	No	None	No.
None	Each householder looks after their own.	No	None	No.
None	No; owners pay cost; special rates.	No	None	No.
Two; yes	No	None	No	No.
None	Night soil removed at a cost of \$1.20 per family annually.	No	None	Yes; 2 parties fined for burying night soil in the village contrary to by-law.
One; no license; not inspected.	No	No	None	No.
One; not licensed; no	No	No	None	No.
Two	No; removed by householder.	No	None	No.
One; yes; cooked and fed to hogs; no.	No	No	None	No.
One in municipality	No	No	None	No.
One; no inspection of carcasses.	No	No	None	No.

VILLAGES.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board.	Contagious diseases
Eganville	F. D. Galligan, M.D.; J. A. Kilts.	Five inspections made yearly.	Scarlatina, 1 case; typhoid, 2 cases.
Embro	John Ross, M.D.; E. Cody.	One annual inspection, and at intervals if deemed necessary.	None
East Toronto	C. A. Britton, M.D.; W. A. Clay.	Action taken only when complaint is made.	Scarlatina, 2 cases
Elora	No M. H. O.; W. A. Petrie.	Yes; yes	Scarlatina, 12 cases; diphtheria, 1 case; tuberculosis, 2 cases, 2 deaths.
Erin	No M. H. O.; Wm. Conboy.	Yes; one or two inspections, and when complaints are made.	Scarlatina, 8 cases; tuberculosis, 1 case, 1 death.
Fergus	W. H. Johnson, M.D.; William Ross.	General and special .....	.....
Fort Erie	D. W. Douglas, M.D.; B. F. Mathews.	General inspection; sometimes repeated by order of the Board.	Diphtheria, 3 cases; tuberculosis, 1 case.
Fenelon Falls	A. Wilson, M.D.; Wm. F. Junkin.	Yes; only in the spring, and when complaints are made.	Scarlatina, a few cases; tuberculosis, 1 case, 1 death.
Grand Valley	Geo. J. Campbell, M.D.; Wm. McIntyre.	Yes	Scarlatina, 2 cases; diphtheria, 1 case, 1 death; tuberculosis, 1 case.
Hinchinbrook	J. G. Smith, M.D.; W. A. Mason.	General inspection about 1st May, and when complaints are made.	Diphtheria, 5 cases; tuberculosis, 7 deaths.
Hensall	Jas. Macdiarmid, M.D.; H. J. D. Cooke.	Yes; it is repeated at intervals every year.	None

VILLAGES.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
How is it led; sanitary inspector placed in charge	Yes	Yes	No
Isolation when necessary; no hospital.	Yes; results have been good.	Yes	Yes; no
No; no hospital		Yes	No; no
No hospital; houses placarded and children kept from school.	Yes; results good	No, not always	No; no
Houses placarded and inmates not allowed to mingle with the public.	No	Under supervision of medical attendant.	Yes
Yes; placarding residence.	Yes; no cases for a long time.	Yes; under supervision of M. H. O.	No
As far as possible isolation is carried out; no isolation hospital.	Yes; the M.H.O. reports good results from its use.	To some extent	No; no
No; no hospital; in diphtheria strict measures are adopted.	Yes; a physician would not be considered doing his duty if he did not administer anti-toxine.	Yes generally; especially in diphtheria cases,	No; no
Yes; in scarlet fever patient placed in separate building, waited upon by one nurse; in diphtheria patient isolated in one room and house placarded.	Yes; used in fatal case; it has been used outside municipality with success.	Yes	No; schools are inspected by M. H. O.
Yes; isolation hospital, Ottawa.	Yes; results of anti-toxine very favorable.	Yes; M. H. O	No
No contagious diseases this year; when necessary it is carried out.	No diphtheria this year	No	Yes; no certificate of vaccination.

VILLAGES.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Eganville	Yes	Wells; 25 to 35 ft. deep.	No; no
Embro	Yes	Wells; 30 ft	
East Toronto	No	Springs	No; no
Elora	No	Wells; from 8 to 12 ft.	No; no
Erin	Yes	Wells; 30 ft. deep	No; no test.....
Fergus	To M.H.O. and M.D's..	Wells; 20 to 25 ft.....	No dairy in municipality
For Erie	No	From wells	No; no
Fenelon Falls	No	Wells; average about 15 ft.	No
Grand Valley	No	Wells; artesian, over 100 ft.	No
Hinchinbrook	No	Wells; 12 to 16 ft.....	Ottawa inspection considered sufficient—Hinchinbrook being a suburb.
Hensall	No	Wells; 25 or 30 ft.....	No; no

VILLAGES.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
None.....	No	No	None	No.
One; kept in good condition.	No	No	None	No.
None	Garbage is removed annually by municipality; night soil by householders.	None	No	No.
Three; no license; inspection at intervals; no inspection of carcasses.	No; private.....	No	None	No.
None; no; no	No	No	None	No.
Two; not licensed, but are inspected.	No	No	None	No.
Two; not licensed; offal is fed to hogs or buried in manure piles; no inspection of carcasses.	No	No	Two slaughter houses; not licensed.	One party was prosecuted and fined for leaving offal in manure pile.
None	No; done by private contract.	No	No	No.
One; no; fed to hogs; no.	No	No	None	No.
None	Night soil removed by contractor holding permit from Board at \$1.00 for every 16 cubic ft.	No; none.....	None	No.
None	No	No	None	None.

VILLAGES.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Hagersville	Robert McDonald, M.D.; John H. Scott.	General sanitary inspection, and action taken on complaint.	Diphtheria, 2 cases, 2 deaths.
Hastings	Rich'd. Coughlan, M.D.; A. Wilson.	General sanitary inspection twice a year.	None
Holland Landing	No M.H.O.; F. J. Sheppard.	Yes	Tuberculosis, 1 case, 1 death.
Iroquois.....	D. Johnston, M. D.; Allan McInnis.	Sanitary inspector makes two inspections annually.	Tuberculosis, 3 deaths ..
Kingsville.....	P. D. White, M.D.; W. A. Smith.	Yes; regular inspection.	Diphtheria, 2 cases
Lakefield	Alex. Bell, M.D.....	Twice a year and when required.	Typhoid, 2 cases; tuberculosis, 2 deaths.
Lucknow	A. G. Elliott, M. D.; Hugh Morrison.	One general inspection by sanitary inspector in May, who also investigates complaints.	Tuberculosis, 2 cases....
Lanark.....	No M.H.O.; W. A. Field.	Yes; twice in the year or by sanitary inspector.	Diphtheria, 1 case
Lucan.....	—, Shaw, M.D.; Geo. A. Stanley.	Yes; twice a year.....	Scarlatina, 1 case
Mt. Brook	N. C. McKinnon, M.D.; William Turner.	Yes; inspected carefully every spring.	Tuberculosis, 1 death ...

VILLAGES.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes; patients and attendants isolated; house placarded; no hospital.	No	Yes, thoroughly	Yes; once a year
No occasion	No; have not had an outbreak of diphtheria since introduction of anti-toxine.	Yes	No; no
Yes; none	Don't know	Yes	Yes; yes
None			
Yes; house containing patient quarantined; all exposed persons quarantined.	Yes, with immediate and satisfactory results; the beneficial effects of anti-toxine are distinctly noticeable.	Yes	Yes; no
Yes; isolated in room; no hospital.	No	Yes; by M.H.O.	No, but Board are having all children not vaccinated done next week, and in future certificates will be required.
No M.H.O.; only placards house in which disease exists.	Have had no cases for some years.	M.H.O. looks after disinfection.	No; no
Yes; houses quarantined and fumigated.		Yes, but not by latest improved methods.	No; no
No	None used	Yes	No; no
Yes; generally sent to Nichols' hospital, Peterboro'.	Don't know	Yes	Yes; no

VILLAGES.—Continued.

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supplied used on the premises. If from well, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Hagersville	No	Wells, 12 to 18 feet; drilled wells from 50 to 100 ft.	No; no dairy in the municipality; M.H.O. has inspected principal dairy outside of village and found it in a most satisfactory condition.
Hastings	No	Wells, natural springs ..	No; no
Holland Landing	Yes	Wells; 25 to 40 ft	No; no
Iroquois.....	.....	.....	.....
Kingsville.....	To M.H.O	Water supply from lake and wells occasionally when not condemned.	No
Lakefield	Yes.....	Wells and river; 15 to 25 feet average depth of wells.	No
Lucknow.....	No	Wells: 25 ft deep	No
Lanark	Yes... ..	Wells; 20 to 40 ft	No; have not heard of any cases of tuberculosis.
Lucan.....	No	Wells	No
Millbrook	No	Spring water, conducted by pipes.	No

VILLAGES — *Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See Sec. 63, Public Health Act). How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, and results of same.
One; yes; fed to hogs.	No; night soil removed by occupants and buried in fields adjoining the village; garbage removed in similar way.	No	Slaughter-house regulated by Board of Health.	No.
One at outskirts of village; fed to hogs; no.	No	No	No	No.
None	No	No	None	No.
None	No .....	.....	.....	No.
None	No	No	No	No.
None allowed	Each householder removes or destroys their own; deep closets cleaned once or twice a year.	No	None	No.
None; not allowed in the municipality.	No; every householder supposed to remove night soil when ordered by sanitary inspector.	No	None	No.
One; not licensed; fed to hogs; no.	No	No	One slaughter house; not licensed.	None.
None	No	No	None	No.
Two; not licensed; boiled and fed to hogs.	No	No	None	No.

VILLAGES.—Continued.

Name of municipality.	Name of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or "is action taken only when complaint of nuisance is made to Board?"	Contagious diseases.
Madoc	E. D. Harrison, M.D.; B. O'Hara.	Yes	
Maxville	Jas. T. Munro, M.D.; Chas. McNaughton.	Only when complaints are made.	Typhoid, 2 cases; tuberculosis, 2 cases.
Milverton	Wm. Egbert, M.D.; W. D. Weir.	Yes; each year.	None
Merrickville	No M.H.O.; J. Johnston	Annual	No
Newcastle	Dr. A. Farncomb; G. W. Curtis.	General inspection at intervals.	None
Norwood	G. A. Pettigrew, M.D.; James Calder.	Yes; every year	None
Newboro'	R. King, M.D.; L. S. Lewis.	Yes; once a year	None
Newburgh	W. J. Beeman, M.D.; Chas. Welbanks.	Yes; yes.	Tuberculosis, 1 case, 1 death.
Norwich	E. E. Harvey, M.D.; Wm. Fairley.	General inspection during every week, afterwards when complaints are made.	Scarlatina, 5 cases, 2 deaths; typhoid, 14 cases, 2 deaths; tuberculosis, 2 deaths.
Oil Springs	No M.H.O.; D. P. Sick.	Yes; sanitary inspector inspects three or four times a year.	Scarlatina, 4 cases; diphtheria, 1 case, 1 death.
Omamee	T. S. Cameron, M.P.; D. A. Balfour.	Only when complaint is made.	Typhoid, 2 cases

VILLAGES.—Continued.

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
.....	.....	.....	No; no
Yes; isolated on premises.	The medical health officer has used it with very satisfactory results.	Yes	No; no
No	No	No	No; no
No	Don't know	Yes	No; no
No isolation or hospital ...	Occasionally	Yes	School inspected; no enforcement of vaccination.
Yes	Yes	Yes	Yes; no
Had no occasion	Two cases; physicians say they keep it.	It would be	Inspected once a year; vaccination certificate not required.
Yes	No cases	Yes	Yes
Patients isolated as much as possible in their home; no hospital.	No	After scarlatina or diphtheria it is usual for inspector to supervise the disinfection of the houses.	No; no
No hospital; home strictly quarantined.	.....	No; generally done by physician in charge.	Sanitary inspector inspects schools; no certificate required.
Yes; no hospital.	No cases; cannot say	No	No; no

VILLAGES.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supplied used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Madoc	No	Wells; 20 to 30 ft	No
Maxville	Yes	Wells; 20 to 24 ft	No ..
Milverton	No	Wells; about 10 ft	No
Merrickville	Don't know	Wells; cannot say	No
Newcastle	Yes; to M.H.O	Wells; from 6 to 8 ft. deep.	No inspectors of dairy cows.
Norwood	No	Wells	No; no
Newboro'	Yes	Wells; 10 to 30 ft	No; no
Newburgh	No	Springs	No
Norwich	Yes	Wells; from 20 to 60 ft .	No inspection
Oil Springs	No .....	.....	None
Omamee	No	Wells; 15 to 20 ft	No

VILLAGES.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is official disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
Two; no; no	Yes	No	None	No.
Two; no	No	No	None	No.
One	No	No	Piggery in connection with cheese factory.	No.
None	No	No	None	No.
One	Buried or burned...	No	No	No.
None	Yes	No	None	No.
None	No	No	None	No.
One; no	Each party looks after their own.	No	One tannery; 1 cheese factory; 1 slaughter house.	No.
One; not licensed, but inspected.	Each householder responsible for his own garbage and night soil.	None	None	No.
.....	Garbage and night soil is removed by scavengers at 50c per bbl.	No	None	No.
None; no; no	No	No	None	No.

TOWNSHIPS.—*Continued*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Paisley.	M. C. Black, M.D.; N. McKechnie.	Sometimes it is repeated.	None.
Parkhill.	Thos. Ovens, M.D.; J. A. Mabury.	Yes, and when complaint is made.	Scarlatina, 10 cases; diphtheria, 4 cases; tuberculosis, 1 case, 1 death.
Portsmouth.	No M.H.O.; Thos. Kelly.	General inspection in the spring.	Typhoid, 1 case; tuberculosis, 1 case, 1 death.
Port Stanley.	L. J. Mothersill, M.D.; James Gough.	Yes; repeated during the year.	Scarlatina, 3 cases, 1 death; tuberculosis, 1 case, 1 death.
Port Colborne.	J. B. Neff, M.D.; Frank D. Noble.	Only when complaints are made to Board.	Tuberculosis, 1 case.
Port Dalhousie.	J. H. Considine, M.D., Sec'y.	General sanitary inspections twice a year and when complaints are made.	Scarlatina, 1 case; typhoid, 1 case.
Port Carling.	— Canniff, M.D.; R. G. Pearson.	Sanitary inspection is made at intervals every year, and general inspection every spring.	.....
Point Edward.	A. N. Hays, M.D.; W. Mitchell.	Action taken when complaint of nuisance is made to Board.	Typhoid, 2 cases.
Port Rowan.	E. Meek, M.D.; Jas. Ryan.	Once in a year, and when complaints are made.	None.
Port Perry.	D. Archer, M.D.; F. M. Yarnold.	Yes; by sanitary inspector and on complaint to Board.	Scarlatina, 2 cases, 1 death; tuberculosis, 2 cases, 2 deaths.
Richmond.	R. C. Channonhouse, M.D.; John Reilly.	When complaint of nuisance is made to Board.	Typhoid, 10 cases, 1 death
Rockland.	W. D. Ferguson, M.D.; A. E. Erskine.	General sanitary inspection twice a year.	Scarlatina, 2 cases; typhoid, 6 cases; tuberculosis, 10 cases.

TOWNSHIPS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
es; no hospital.	No	Yes.	Yes.
es.	Yes; favorable	By M.H.O. or physician in attendance.	No; no
usually removed to city hospital, Kingston.	Yes; no cases this year...	No	No; no
es; infected houses quarantined; no hospital.	Yes; results good in 1897.	Yes; M.H.O.	No.
o; placarding	Yes; results good	No	No.
es; as far as possible....	None required.....	Yes.	None.....
o; no occasion.....	No; no diphtheria.....	Yes; when any cases occur.	Yes; no.
o isolation.....	Yes.	Yes.	Inspected several times yearly. No certificates of vaccination this year.
only by placard	Anti-toxine is furnished by the municipality to M. H.O.	.....	No; no
es; confined in separate part of dwelling; no isolation hospital.	Yes; results very satisfactory.	By physician in attendance: ordinary methods.	Yes; no.....
es.	Yes.	Yes.	Yes; no.
es. ....	.....	Yes.	No.....

TOWNSHIPS,—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Paisley.	Yes	Wells.....	No
Parkhill	Yes.	Wells ; 180 ft. deep	No.
Portsmouth	No	Wells	No
Port Stanley.....	No	Wells	No.....
Port Colborne	No	Water works system....	No.....
Port Dalhousie.	None	Springs	Yes; none.....
Port Carling.....	Cannot say	Spring wells	No.....
Point Edward	Yes.	Wells ; 15 to 20 ft	No inspection of dairy cows ; no cases of tuberculosis.
Port Rowan.....	No ; yes	Wells ; 36 to 40 ft	No dairy in municipality
Port Perry	Physicians only.....	Wells ; 18 ft.....	No ; no dairy cows in municipality.
Richmond.....	No	Wells ; 18 ft.....	No ; no ; no.....
Rockland	No	Ottawa River.....	No

TOWNSHIPS.—Continued.

in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by an officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See Sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under the Public Health Act? State in detail the nature of the case, and results of same.
e	No	No	None	No.
e	Yes; 1 to 4 in family 50c; 6 to 8 in family 60c.	No	None	No.
e	No; except in spring time.	No	None	No.
y; permit from council; offal is fed hogs.	No	No .....	.....	No.
e	No	No	None	No.
; in good condition.	None	No	None	No.
; offal buried; inspection is made Board of Health	Night soil is disposed of in usual way and inspection is made.	No	None	No.
e	No regular system; generally buried or burned.	No	None	No.
allowed; with corporation.	No	No	None	No.
e	No	No	None	No.
e; no; drawn away; no.	No	No	None	No.
e	No	No	None	No.

VILLAGES — *Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? Or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Richmond Hill.	No. M.H.O. ; M. Teffy	Yes, by inspector	
Sturgeon Falls.	L. E. Bolster, M.D. ; H. E. McKee.		None.
Southampton	P. J. Scott, M.D.; James Howe.		Diphtheria, 4 cases, death; typhoid, 3 cases.
Shelburne	R. W. Rooney, M.D.; D. C. Dunbear.	Yes; annual inspection and when complaint is made.	
Stouffville	J. A. Freel, M.D. ; A. G. Brown.	Once a year	Typhoid, 3 cases; scarletina, 1 case; tuberculosis, 2 cases.
Streetsville	No M. H. O. ; D. J. Pinney.	Two; house to house inspections in the year.	Tuberculosis, 6 cases, deaths.
Stirling	J. S. Sprague, M. D. ; John S. Black.	Yes; repeated at intervals.	Diphtheria, 4 cases.
Sundridge	A. Carmichael, M. D. ; J. Dunn.	Yes; inspection made yearly.	Diphtheria, 1 case; tuberculosis, 5 cases 1 death.
Springfield	R. W. Shaw, M.D.; J. B. Lucas.	Yes; yes.	Typhoid, 1 case
Stayner	Chas. E. Jakeway, M.D.	Yes; yes.	Tuberculosis, 1.

VILLAGES.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes; no hospital. ....	.....	Yes.	Don't know.
Yes; houses quarantined.	Yes.	Yes.	No; no
Yes.	No	Yes.	Yes; no
Yes; no isolation hospital; house is quarantined.	Yes; two cases of diphtheric-croup far advanced, recovered under its treatment; anti-toxine is admitted to be a successful treatment by physicians here when used in time.	Yes.	No; no
Not always; no hospital.	No cases.	Generally by physicians in attendance.	No
No hospital exists ....	.....	Yes.	Yes; certificate of vaccination not required.
Yes; quarantined; no hospital.	Yes; satisfactory in connection with old, tried and reliable remedies.	Yes.	Yes; no
Yes; isolated at patients home.	When needed.	Yes.	No; no
No; cases quarantined.	Yes.	Yes.	Yes; no
Not very well; houses placarded.	No diphtheria for several years.	No.	No; no

VILLAGES.—*Continued*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supplied used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Richmond Hill.....	Don't know	Wells	No
Sturgeon Falls.....	No	Wells; 12 ft.....	No
Southampton.....	No	Wells; 16 to 18 ft	No; no
Shelburne	No	Water source from well; 480 deep.	No test; no inspection..
Stouffville.....	Yes.	Supplied by gravitation from springs and wells.	No; none reported.....
Streetsville	Physicians only	Wells: 35 ft.....	No systematic inspection of dairy cows; premises are inspected by sanitary inspector; no cases of tuberculosis have been discovered.
Stirling	No	Wells; 30 ft.....	No; no
Sundridge.	Yes.	Springs.....	No; no
Springfield.	No	Wells	No; no
Stayner.	No	Don't know	No.....

VILLAGES.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by an officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses of whole is connected with public sewers?	State No. and kind of non-ions trade-s. (See Sec 63, Public Health Act). How lic used and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, any results of same.
Two	No system.....	No	Slaughterhouses	No.
None	No	No.....	None	No.
Two; no	No	No	None	No.
Three; outside cor- poration.	No	No		The parties summoned before magistrate for unsanitary condition of premises or yards were not fined but had to pay costs, and comply with demands of inspector.
Two; no; don't know; no.	No	No	None	No.
Two; licensed; offal fed to hogs; no inspection of carcasses.	No	No	None	No.
None	No	No.	None	No.
One; no; buried; no.	No	No.	None	No.
Two; no; buried...	No	No.	None	No.
None	No	No.	None	No.

VILLAGES.—*Continued*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases
Sutton.	C. T. Noble, M.D.; T. K. Barnard.	General sanitary inspection.	Scarlatina, 1 or 2 cases; diphtheria, 1 case.....
Tweed.	W. M. Mather, M. D.; Wm. Wray.	Yes; once a year, in general and when complaint is made.	Scarlatina, a few light cases; typhoid, 3 cases 1 death; diphtheria, 12 cases, 1 death.
Tara.	Thos. Wilson, M.D.; D. J. Tobey.	Yes; action taken only by complaint.	Diphtheria, 6 cases, 1 death.
Thedford.	No M. H. O.; Wm. Brooks.	Yes; twice yearly.....	Scarlatina, 2 cases.
Thornbury.	G. W. Hurlburt, M.D.; E. Rorke.	General sanitary inspection each year.	.....
Tilbury.	M. Sharp, M.D.; A. A. Wilson.	Yes; repeated.	Typhoid, 3 cases; diphtheria, 1 death; tuberculosis. 1 case, 1 death.
Tiverton.	W. J. Chambers, M.D.; J. S. Evans.	Action taken when necessary.	Scarlatina, 1 case.
Vienna.	J. H. Hoover, M. D.; W. Watts.	Action taken when complaint of nuisance is made to Board.	Scarlatina, 2 cases.
Wellington.	J. B. Ruttan, M. D.; Thos. S. Stinson.	No; no; only when complaint is made.	Diphtheria, 2 cases.....
Weston.	E. F. Irwin, M.D.; R. H. Leighton.	General inspection every spring.	Scarlatina, 10 cases; diphtheria, 1 case; typhoid, 1 case; tuberculosis, 1 case, 1 death.
Wroxeter.	No M. H. O.; J. Cowan.	No.....	None.

VILLAGES.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes.	Used when any cases occur.	Yes.	No; no
Yes; as far as possible....	Used in some cases	Yes.	Yes; no
Yes	No	Yes; M.H.O	No
No hospital, but always isolated from other members of the family.	Yes	Yes; by M.H.O	Yes; yes
Houses placarded	Yes	Yes	Yes; no
Yes	No cases	No	No
No hospital .....	.....	Yes .....	.....
No hospital	Don't know	Yes	Don't know
Yes; in the homes of patients; no hospital.	Yes	Under supervision of M. H. O.	No; no
Yes; no hospital	Yes; results good	Yes	No
No	No	No	No

VILLAGES — *Continued*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Sutton	Yes.	Wells	No ; no
Tweed .....	.....	Wells	Yes
Tara	No	Wells, 15 to 30 ft	No ; no
Theford .....	.....	Wells, 30 ft	Twice each year
Thornbury	No	Wells, 15 to 25 ft	No dairy cows in corporation.
Tilbury	No	Wells, 6 to 8 ft	No
Tiverton .....	.....	Wells, 20 to 30 ft	No
Vienna	Yes	Wells, from 16 to 20 ft ..	Don't know
Wellington	No	Wells, 7 to 20 ft	No ; no ; no
Weston	No	Wells, 18 to 20 ft	No
Wroxeter	No	Wells	No

VILLAGES.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is a deal disposed of? Is there systematic inspection of carcasses by an officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what portion of houses of whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act). How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, any results of same.
Two; no systematic inspection of carcasses.	No	No	Slaughterhouses	No.
One buried and fed to hogs.	No	No	one	No.
One; yes; offal buried; yes.	No	No	None	No.
None	No	No	None	No.
Two	No	No	None	No.
None	No	No	None	No.
One				
Two; no	No	No	None	No.
One; no	No	No	None	No.
Six licensed; buried; no.	No	No	None	No.
.....	None	No	None	No.

VILLAGES.—*Concluded.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board.	Contagious diseases.
Woodbridge	No M. H. O.; J. McClure.	Yes; twice a year	None
Waterford	A. T. Gould, M. D.; S. Cunningham.	Only when complaint is made.	Diphtheria, 1 case; typhoid, 1 case.
Winchester	P. McLaughlin, M. D.; N. W. Beach.	Yes; twice yearly	None
Wardsville	J. T. McKillop, M. D.; D. Johnson.	Only when complaint is made.	None
Waterdown	J. D. McGregor, M. D.; G. F. Green.	General sanitary inspection; action taken only on complaint.	Scarlatina, 2 cases; diphtheria, 1 case; tuberculosis, 1 case.
Woodville	J. Grant, M. D.; J. C. Gilchrist.	Yes	Typhoid, 1 case; tuberculosis, 1 case, 1 death.

VILLAGES.—*Concluded.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
No occasion	No occasion	Yes	Yes
No.....	Don't know	No	No
Yes; in home of patient; no hospital.	Yes; satisfactory	Under direction of M. H. O.	No; no
Isolation of homes and quarantine of house.	Yes	Yes	No; no
Yes; no isolation hospital.	Yes; results good	Yes	No; no
Yes; no hospital; house placarded.	No	Yes	No

VILLAGES.—*Concluded.*

Name of municipality.	Are means for modification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state the depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the high prindle test has been used.
Woodbridge	Yes	Wells, 50 ft	Have no dairies
Waterford	No	Wells	No
Winchester	Yes	Wells, 15 to 20 ft	No; no
Wardsville	No	Wells, 12 to 20 ft	No; no
Waterdown	Yes	Wells, average depth, 20 ft.	No
Woodville	No	Wells, 20 to 30 ft. deep	No

VILLAGES.—*Concluded*

How many slaughter houses in municipality? Are they licensed? On evidence of being kept in good sanitary condition? If not, is official inspection of carcasses by any officer of the P. and C.?	Is there systematic removal of garbage and night soil? If so, in what manner? How is the removed material disposed of?	Is there a public sewerage system? If so, what proportion of houses of whole is connected with public sewers?	State No. and kind of notifications under Public Health Act. How many have been notified?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, any results of same.
Two; official taken outside municipality and fed to hogs; no inspection of carcasses.	All buried	No	None	No.
None	Yes	No	None	No.
None	Night soil is removed annually.	Sewers or drains for surface drainage.	None	No.
None	Removed by householder.	No	None	No.
None	No	No	None	No.
None	No	No	None	No.

TOWNS.

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Alliston.....	J. J. Harper, M. D.; W. M. Lockhart.	Yes; yes	Tuberculosis, 3 deaths..
Aurora	No M.H.O.; S. Lundy.	Action taken only when complaint is made	None.....
Aylmer	G. F. Clarke, M. D.; Junius Bradley.	Inspection twice each year, in May and September; action taken when complaint is made	Typhoid, 1 case; tuberculosis, 1 case.
Almonte	No M.H.O.; L. Coulter.	Yes; yes; action also taken on complaint.	Scarlatina, 25 cases, 1 death; diphtheria, 1 case.
Bowmanville	A. S. Tilley, M.D.; John Lyle.	When complaint is made.	Scarlatina, 10 cases; diphtheria, 5 cases; typhoid, 15.
Berlin.....	J. E. Hett, M. D.; H. Aletter.	General inspection.....	Scarlatina, 4 cases; diphtheria, 63 cases, 7 deaths; typhoid, 45 cases, 1 death; tuberculosis, 8 deaths.
Brampton	J. T. Mullin, M. D.; T. J. Blain.	Yes; yes	Tuberculosis, 5 cases, 5 deaths.
Brockville	Harry E. Vaux, M. D.; G. A. McMullen.	Yes; yes; prompt action taken on all complaints	Scarlatina, 19 cases, 1 death; diphtheria, 28 cases, 5 deaths; typhoid, 22 cases, 3 deaths; tuberculosis, 22 cases, 22 deaths.
Bracebridge	No M.H.O.; Jas. Boyer.	Action taken only when complaint is made.	None reported.....

TOWNS.—*Continued.*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from now school children each year?
Yes; no hospital	No occasion	Yes	No; no
Yes; when required; no..	Don't know	Yes	No
No; only in cases of small-pox and scarlatina.	.....	Yes	No; no
No hospital	Yes; successful	Yes	No
Yes; no hospital	No	No	No; no
Yes; isolated in their respective homes; isolation hospital now in course of erection.	Yes; very satisfactory if used in due time.	Yes	No
Yes; usual methods	Yes	Yes	Yes; no
Yes; at both hospitals; also at patients' houses.	Physicians report a number of cases with favorable results.	Yes; by sanitary inspector with formaldehyde.	Yes; no
Yes; by sanitary inspector placarding houses; no hospital.	No	Yes	Inspector does; no

TOWNS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Alliston	Yes	Wells, 15 ft	No; none
Aurora	Yes	Waterworks from springs and wells.	No
Aylmer	No	Wells, from 8 to 25 ft.	No; no; no
Almonte	Only to physicians .....	.....	No; no no tuberculosis
Bowmanville	Yes	Wells	No; yes; yes
Berlin	Yes	Supplied from water-works.	Inspection not systematic; occasional by our meat and milk inspector; no; no
Brampton	Yes	Wells, 20 ft	Yes; no
Brockville	Yes	St. Lawrence river; only a few wells now in use, and they are inspected and tested.	Yes: by sanitary inspector: none reported; no tuberculin test enforced now.
Bracebridge	No	Springs	No; no

TOWNS.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to which is connected with public sewers?	State No. and kind ofnoxious trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
Two; offal said to be buried.	No	About	Two slaughterhouses; No. 2 tanneries.	
One; licensed	No	No	None	No.
None in municipality; all in town-ship.	Yes; all by the week or month; garbage in spring and fall.	No	Four slaughterhouses; not inspected.	Yes; the nuisance being removed, case was allowed to drop.
Two; not licensed; no inspection of carcasses.	Removed at the instance of sanitary inspector; cost is paid by householders.	No	None	No.
Four; yes; yes	No	No	None	No.
Three; yes; fertilizer; inspection general.	Yes; within the scavengers' limits; vaults cost from \$1.00 to \$2.50; dry earth closets cost from 12½c. to 25c. each; muddy garbage usually 12½c; dry earth closets and garbage per annum, \$2.50; manure, 25c. per cubic yard.	Yes; from 25 to 30 per cent.	None, except gas-works.	One; a butcher for feeding raw offal and for polluting creek; fined \$5.00 and costs.
Three; not licensed; boiled; no.	No; night soil removed regularly at cost of householder	No	Three slaughterhouses; one gas mfg. co.	Yes; one for using slaughter-house contrary to Public Health Act.
None; all outside the limits; only of carcasses brought in the market for sale.	Yes; a charge of 50c. per bbl. of 45 gallons on number of bbls. removed.	Yes; about 33½ per cent.	Two tanneries; one gas mfg. co.	No.
Two; no; boiled; no.	Yes; Pits, \$2.00, boxes, \$3.00, per year.	No	None	No.

TOWNS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board.	Contagious disease
Barrie.....	L. Oliver, [M. D.; E. Donnell.	Yes; no; action taken when complaints are made or through observation.	Diphtheria, 1 case; typhoid, 2 cases, 2 deaths; tuberculosis, 11 cases, 11 deaths.
Collingwood.....	A. R. Stephen, M.D.; Jno. Hogg.	Yes, by sanitary inspector and M. H. O.	Scarlatina, 6 cases; diphtheria, 5 cases; tuberculosis 7 cases, 7 deaths
Clinton	J. W. Shaw, M.D.; Wm. Coats.	Yes; repeated also	Scarlatina, 75 cases; diphtheria, 1 case; typhoid, 2 cases; tuberculosis, about 10 cases, 4 deaths.
Cobourg.....	R. E. McNicholl, M.D.; D. H. Minaker.	Regular sanitary inspection once a year.	Smallpox, 1 case; scarlatina, 9 cases, 1 death; diphtheria, 4 cases, 1 death; typhoid, 8 cases; tuberculosis, 4 cases, 4 deaths.
Cornwall	Chas. J. Hamilton, M.D.; Geo. S. Jarvis.	Yes, at intervals	Scarlatina, 25 cases; diphtheria, 10 cases, 1 death; typhoid, 20 cases, 3 deaths; tuberculosis, 7 cases, 7 deaths.
Campbellford ..	No M. H. O.; John Graham.	Yes, twice a year.	Typhoid, 2 cases; tuberculosis, 4 cases, 4 deaths.
Dresden.....	D. Galbraith, M.D.; Arthur Smith.	Yes; no	Scarlatina, 3 cases, 1 death; typhoid, 2 cases.
Dundas	T. A. Bertram, M.D.; Jas. More	As a general rule action is taken when complaints are made.	.....
Essex	J. W. Brien, M.D.; John Walters.	General inspection repeated at intervals.	Scarlatina, 3 cases; diphtheria, 4 cases, 1 death; typhoid, 12 cases, 1 death; tuberculosis, 1 case.

TOWNS.—Continued.

Is isolation of contagious diseases systematically carried out? State methods adopted, and whether any isolation hospital exists	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes; houses placarded and closely guarded; no isolation hospital.	No	Yes	No; no
Fairly.....	Occasionally.....	Yes.....	No.....
Yes, by placarding.....	Had only one case, it was used successfully.	In some cases.....	No; no
Patients are isolated in their homes and thorough disinfection carried out; no isolation hospital, the Board has a temporary one at present for small-pox patient.	It has been used 3 times in 5 cases successfully.	Yes, in every case	No.....
Yes.....	Yes; almost universally good.	Yes.....	Yes; no.....
No hospital.....	No diphtheria .....	.....	No.....
Yes, in their own homes; no isolation hospital.	Yes; results good	Yes	Yes; yes.....
No isolation hospital.....	Yes	Under supervision of Health officer.	No; no.....
Yes, quarantine and placarding houses; no hospital.	Yes; favourable is the report from all physicians.	Yes	Yes.....

TOWNS.—Continued.

Name of municipality.	Are forms for notification by teacher and M. H. O. of contagious diseases supplied?	Give the source of water supplied used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred? and state whether the tuberculin test has been used.
Barrie.....	No.....	Artesian wells.....	Yes; no.....
Collingwood.....	Yes.....	Waterworks.....	No; no; no.....
Clinton.....	Yes, to the principal...	All wells, ranging from 10 to 70 feet.	No; yes; tuberculin test used privately.
Cobourg.....	Yes.....	From waterworks, Lake Ontario.	Yearly inspection of dairies is made as regards cleanliness, stabling and feeding; no tuberculin tests made, nor has any cases of tuberculosis been reported.
Cornwall.....	Yes, by M. H. O.....	St Lawrence River.....	No; no.....
Campbellford.....	No.....	Wells, 24 ft.....	No dairy in municipality
Dresden.....	Yes.....	Wells, 15 to 20 ft.....	None in municipality; no.
Dundas.....	No.....	Four springs in connection with reservoir of town.	No inspection; no cases.
Essex.....	Yes.....	Artesian wells and water works system.	Yes; no tuberculosis, no test.

TOWNS.—Continued.

How many slaughter-houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by an officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis, and cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses of whole is connected with public sewers?	State No. and kind of noxious trades. (See Sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under the Public Health Act? State in detail the nature of the case, and results of same.
Three; no; offal boiled and fed to hogs.	Night soil removed; cost borne by householders; no systematic removal of garbage except in the spring.	Yes; between 4 and 5 miles on principal streets; fully 4/5 of the houses on these streets have connection with the sewers.	None	No.
Three; no, fed to pigs; no.	Yes, 15c. per month.	No	None	No.
None, all outside of the town, no license.	Yes, done by private means.	No	None	No
Three; licensed and kept in good sanitary condition; offal is fed to hogs or buried.	No; the sanitary inspector orders all householders to remove all garbage and night soil at their own expense.	About 2 miles; public sewerage.	One establishment for storing and curing hides.	One prosecution; town and county council to abate a nuisance arising from drainage of county gaol.
Three; no license, but are inspected by M. H. O.; offal is buried; no.	Yes; each householder makes his own arrangements for removal and pays cost of same.	Yes, about one-third.	Manufacture of gas and storing of hides.	No.
None; no inspection of carcasses.	The matter is attended to by sanitary officers at cost of occupant.	No	None	No.
None; no.....	Removed by householder at their own cost.	No	None	No.
None; no inspection of carcasses.	Removed by householder; sanitary inspector looks after it and sees that the law is complied with.	No	Two tanneries	No.
None	Yes; each householder pays for his own.	No	None	No.

TOWNS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Forest	Walter Boyd, M.D.; W. G. Owens.	Yes, once a year and upon complaint.	Scarlatina, 21 cases, 1 death.
Goderich	Wm. J. C. Holmes, M.D.; Wm. Mitchell.		Scarlatina, 9 cases, 2 deaths; typhoid, 11 cases; tuberculosis, 2 deaths.
Gore Bay.	J. Johnston, M. B.; John S. Hawkins.	Action taken upon complaint to Board.	None.....
Gravenhurst.....	A. P. Cornell, M.D.; H. Oaten.	Yes; yes, and action taken on complaint.	Tuberculosis, 1 death....
Galt	J. S. Wardlaw, M.D.; Adam Kay.	Yes; yes	Diphtheria, 54 cases, 1 death; typhoid, 56 cases, 2 deaths; tuberculosis, not reported till after death.
Glencoe	J. Y. McLachlin, M.D.; G. M. Harrison.	Yes; yes	Typhoid, 2 cases reported
Harriston	W. A. Harvey, M.D.; A. A. Stewart.	General inspection early in the spring.	Diphtheria, 3 cases, 1 death; tuberculosis, 1 death.
Huntsville	F. L. Howland, M.D.; John Hoile.	Yes, and action is taken when complaint is made.	None.
Kincardine	N. Hopkins, M.D.; J. H. Scougall.	General sanitary inspection and repeated at intervals.	Scarlatina, 12 cases; diphtheria, 7 cases, 1 death; typhoid, 7 cases.
Leamington	G. C. Moxon, M. D.; Wm. Coultis.	Only when complaint is made.	Scarlatina, 2 cases; diphtheria, 10 cases, 2 deaths; typhoid, 3 cases.
Listowel	L. W. Thompson, M.D.; W. E. Binning.	Yes; Yes	Scarlatina, 30 cases, 1 death; diphtheria, 13 cases, 2 deaths; typhoid, 14 cases; tuberculosis, 7 cases, 7 deaths.

TOWNS.—Continued.

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes, by placarding houses where cases exist.	Think so	Yes, except when proper disinfection is certified to by attending physician.	Yes; no
No; no	None used this year	No	No; no
Yes, isolate and disinfect; no hospital.	Have not had any cases of diphtheria for 5 years.	Yes	No
No, as regards consumption.	No; no occasion	No	No; no
Yes, patient isolated and quarantine established; no.	Yes; excellent, only 1 death out of 54 cases, and in this case the patient had been ill 3 or 4 days before attended to.	Yes	Yes; no
No hospital; houses placarded.	Yes; successfully used	Yes, by attending physician.	No
Yes	Yes; when administered early.	Don't know	Yes
.....	Yes; successful	Yes, by Inspector	Not this year
The family confined to house; house placarded; no hospital.	.....	Under personal supervision of Sanitary Inspector.	No certificate of vaccination required.
Houses are isolated as much as possible and placarded; no hospital.	Yes; results very satisfactory.	Yes, or by attending physician.	No; no
Yes; houses placarded and inmates quarantined.	Yes; results good	No	No; no

TOWNS.—*Continued*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises? If from wells, state usual depth of water bearing stratum	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Forest.....	No.....	Wells, 20 feet.....	No
Goderich.....	No.....	Lake Huron.....	No ; no ; no.....
Gore Bay.....	No.....	Principally springs, carried through galvanized pipes.	No.....
Gravenhurst.....	Yes.....	Wells, 25 ft. deep.....	No ; no.....
Galt.....	Yes.....	Waterworks system and wells.	Yes ; no.....
Glencoe.....	Ye	Wells, from 15 to 20 ft ..	No.....
Harriston	Yes.....	Wells, 16 to 24 ft	No.....
Huntsville.....	No.....	Waterworks and wells ..	No dairies.....
Kincardine	No.....	Lake	No drainage in the municipality.
Leamington	No	From water works ; a few wells ; about 11 ft.	No ; o
Listowel	No.....	Principally wells	No ; no

TOWNS.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what portion of houses to which is connected with public sewers?	State No. and kind of noxious trades. (See sec 63, Public Health Act). How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, and results of same.
None	Yes; costs charged against property, 75c per. bbl.	Yes; on parts of King and Main streets.	None	No.
None; no, fed to hogs; no.	No	Yes, 10 per cent....	None	One; a doctor for failure to report a case of scarlet fever; nominal fine.
Three; no license; fed to pigs.	No	No	None	No.
None within municipality.	Removal is done by occupant of property, and payment is made by agreement.	No	None	No.
None; yes, slaughter houses are in tp. of Dumfries and are inspected.	Yes; so much per yard for pits, earth closets and garbage extra.	Partially	Two tanneries, one gas house; inspected regularly.	One; fined \$2.00 and costs.
None; no	Yes; night soil removed at a cost of 24c. per barrel.	No	None	No.
None	No	No	None	No.
None	None	None	None	No.
Two slaughter houses; inspected by sanitary inspector.	Yes; householder pays the cost.	No	None	No.
Two; yes; offal buried; no inspection of carcasses.	No; removed by householders.	No	None	No.
None	No; by householder.	No.	No.	No.

TOWNS.—*Continued.*

Name of Municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases
Mount Forest	No M. H. O. ; W. C. Perry.	Yes ; by Inspector, approved of by Council ; one general inspection in the spring and when complaint is made.	Scarlatina, 2 cases; diphtheria, 2 cases; typhoid, 4 cases, 1 death; tuberculosis, 1 case, 1 death.
Meaford.....	J. G. Clark, M.D. ; G. G. Albery.	No general system ; action only taken when complaint is made.	Typhoid, 2 cases.....
Mattawa	M. James, M.D. ; A. Ridout.	Yes ; yes	Scarlatina, 4 cases; diphtheria, 6 cases.
North Toronto.....	S. R. Richardson, M.D. ; W. J. Douglas.	Once each year	Scarlatina, 5 cases; diphtheria, 1 case, 1 death.
Napanee	No M.H.O. ; J. E. Her-ring.	Yes ; action taken when complaint is made.	Scarlatina, 3 cases ; typhoid, 2 cases.
Niagara Falls	— Burger, M.D. ; W. H. Day.	Sanitary Inspector on duty at all times.	Typhoid, 1 case, 1 death; tuberculosis, 5 cases, 5 deaths.
North Bay	J. W. Carruthers, M.D. ; M. W. Flannery.	Only when complaint is made to Board.	Tuberculosis, 6 deaths ..

TOWNS.—Continued.

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
In the hands of the medical practitioner, who exercises great care.	No.	No.	No.
The attending physicians insist on isolation of the patients in their houses so far as practicable; no isolation hospital.	No.	No, there has been no general epidemic.	No.
Yes	Yes; results good	Yes	No; no
Isolation in the house.	No.	Only when considered necessary by M.H.O.	Not usually; the Board does not require a certificate of vaccination.
Yes; no hospital	Yes	Carried out by physician in attendance.	No; no
Isolated in the house from other members of family; no hospital.	No	By M.H.O.; formaldehyde is used.	No; no
Yes; residence of families are quarantined.	Yes; satisfactory	Yes	No

TOWNS.—Continued

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Mount Forest	Yes	Are putting in water works system; source of supply from wells; 500 ft deep, about 400 ft. through a rock.	No.....
Meaford.....	No; yes; semi-annually.	Georgian Bay	No.....
Muttawa	No.....	Wells and Mattawa river	No.....
North Toronto	Yes.....	Wells are used where the town water main is not laid; depth from 15 to 80 ft.	No.....
Napanee	Yes.....	Wells; 12 to 15 ft. deep.	No.....
Niagara Falls	Yes.....	Niagara river and a few wells.	Yes; yes; 5 cases of tuberculosis, 3 killed and 2 isolated and quarantined.
North Bay	Yes	Lake Nipissing	No.....

TOWNS.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the cases, and results of same.
One; no license; inspector visits frequently; all animals inspected before being slaughtered by a town inspector.	No.....	No.....	None.....	No.
One; no system for disposal of offal; no system of regular inspection.	No systematic removal of garbage; on complaint being made of any unsanitary conditions the Board requires removal of filth, etc., from the premises.	No.....	Two tanneries; not licensed; 1 slaughter house.	No.
None.....	Yes.....	No.....	None.....	None.
Five; permits issued by Board of Health; no inspection made.	Garbage and night soil is in most cases disposed of on premises; we have one excavator who is employed by some parties at 30c. per load for removing night soil.	No.....	Five slaughter houses; licensed.	No.
Two; at extreme limits of municipality; inspected regularly; no.	No; except by carters.	A few blocks only; stone drains mainly.	Bone boiling, 1; storing of hides, 1; soap factory, 1; tallow melting, 1; manuf. of gas, 1.	No.
None.....	Yes; garbage and ashes, 1 waggon load, 50c; night soil, 3 in family, 15c; removal monthly; 4 to 7 in family, 20c; 8 to 12, 25c; 10 and over 40c.	Yes; about seventy per cent.	Storing of hides; not licensed.	No.
None.....	Yes; night soil is removed twice a year; each rate-payer pays cost of removal.	No.....	No.....	No.

TOWNS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases
Ottawa, E.	Geo. Baptie, M.D.; W. M. Barry.	Yes, in May; also when complaint is made.	Scarlatina, 1 case.
Oakville.....	J. S. Williams, M.D.; W. S. Davis.	Inspected at intervals and when Board think it necessary.	None
Owen Sound... ..	Allan Cameron, MD.; Thos. Gordon.	Yes; yes; action taken as well when complaint of nuisance is made to Board.	Scarlatina, 5 cases, 1 death; diphtheria, 1 case; typhoid, 16 cases, 2 deaths
Oshawa	No M.H.O.; Thos. Morris.	Annually and when complaints are made.	Scarlatina, 16 cases; diphtheria, 16 cases, 4 deaths; typhoid, 4 cases, 2 deaths; tuberculosis, 4 deaths.
Orangeville.	A. J. Hunter, M.D.; A. A. Hughson.	Yes; also on complaints.	Scarlatina, 1 case; typhoid, 1 case.
Pembroke	W. W. Dickson, M.D.; A. J. Fortier.	General supervision by sanitary inspector; special action when complaints are made.	Scarlatina, several cases; typhoid, 22 cases; tuberculosis, 12 deaths.
Prescott.....	W. P. Buckley, M.D.; J. B. White.	Yes; and repeated on complaint.	.....
Paris.....	D. Dunton, M.D.; S. Dodson.	One general inspection and at other times when M.H.O. considers it necessary.	Scarlatina, 6 cases; diphtheria, 8 cases; typhoid, 2 cases; tuberculosis, 2 deaths.

TOWNS.—Continued

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes, as far as is known, when the size of the house and family admit of it; sometimes removed to county hospital; no isolation hospital but there are two in adjoining city.	Yes	No; no; yes	No; no
Yes; no hospital	No	Yes	No; no
As far as possible; separation with wet sheet over the doorway and the free use of various disinfectants in solution or as vapor; no isolation hospital.	No; has been used in one case with satisfactory result.	In all cases	No; no
Yes; house placarded; no hospital.	Some physicians use it with good results.	No; under supervision of M.H.O.	No
Yes	Kept on hand	Yes	Yes; no
Yes; no isolation hospital; contagious diseases are isolated in the house; children if any attending school are removed to other houses, or failing that are kept from school; precautions to prevent communication with affected persons are taken; free use of disinfecting liquid.	Yes; all the physicians in town use anti-toxine and all report satisfactory results when used early in the disease; also marked benefit in many cases when the disease had existed for 3 or 4 days.	No; physicians are impressed with the necessity of seeing disinfection carried out; sanitary inspector or M.H.O. keep a general oversight when they suspect that proper precautions are not carried out.	Schools inspected by M. H.O. and sanitary inspector; no certificate of vaccination has heretofore been insisted upon.
No; when cases of diphtheria or small-pox it is carried out.	Yes; cannot give results.	Yes	No
Yes; houses placarded and inmates not allowed to mingle with the public.	Yes; cannot give details; 7 or eight children were treated with anti-toxine with 2 deaths 8 children were immunized none of which took diphtheria.	Yes; under instructions of M.H.O.	Yes yes.....

TOWNS.—Continued.

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Ottawa, E.	No.	Wells; about 12 ft.	No; no cases occurred; yes; the test has been made.
Oakville	No.	Wells; about 20 ft.	No; no
Owen Sound	Yes.	Mostly town system of water works; the usual depth of wells is about 16 ft.	No; 2 cases of tuberculosis.
Oshawa	To physicians only	Wells; 15 to 30 ft.	Yes; veterinary has inspected some herds; no cases.
Orangeville.	No.	Water works system.	No.
Pembroke	Yes.	From water system of town; taken from the Ottawa river.	No; the majority of dairy men had their cows tested a year ago, with negative results.
Prescott.	No.	Wells.	No.
Paris.	Yes; yes. ....	.....	No animal inspection; no cases of tuberculosis; tuberculin test has been used.

TOWNS.—*Continued*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
Two; in good sanitary condition; offal buried; no inspection of carcasses.	No.	No.	Two; butchers	No.
Three; not licensed; fairly good condition; boiled and fed to hogs; no.	No.	No.	No.	No.
One; yes; as a rule it is boiled and fed to pigs; no systematic inspection of carcasses.	No.	Yes.	Storing of hides, soap boiling, tallow melting, slaughtering animals, mnfg. of gas.	No.
One; inspected; offal is fed to pigs.	Dry earth system is used; yes.	Not a complete system.	.....	None.
None; no; no...	By householder; no contract.	No.	None.	No.
None; sanitary inspector keeps under observation all carcasses exposed on market.	Proprietors are requested to keep the premises free from garbage; night soil removed at intervals; no systematic removal.	No general sewerage system.	None.	One prosecution for refusal to clean privy pits.
None.	No.	No.	None.	No.
None.	Yes; night soil costs 15c monthly for 2 earth closets and \$2.50 for pits of 2 cubic yds.; over 2 cubic yds. \$1.50 per yd.; garbage removed by contract.	No.	None.	No.

TOWNS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Preston	N. Malloy, M.D.; M. H. Husband.	Yes; annually and when complaint of nuisance is made.	Scarlatina, 8 cases; diphtheria, 1 case; tuberculosis, 2 cases.
Palmerston.....	A. Greenlaw, M.D.; S. Caswell.	Yes; and on complaint being made.	None
Penetanguishene.....	Geo. Bowman, M.D.; W. H. Hewson.	Yes; yes.....	Diphtheria, 2 cases; tuberculosis, 1 case.
Perth	No. M.H.O.; John A. Kerr.	Sanitary inspector makes a general inspection.	Tuberculosis, 7 deaths...
Port Hope	L. B. Powers, M.D.; J. W. Sanders.	.....	Scarlatina, 12 cases, 1 death; typhoid, 5 cases, 2 deaths; tuberculosis, 2 deaths.
Port Arthur.....	G. S. Beck, M.D.; Jas. McTeigue.	Yes; yes.....	Scarlatina, 10 cases; diphtheria, 5 cases, 1 death; tuberculosis, 4 cases, 4 deaths.
Ridgetown	M. T. McFarlane, M.D.; D. Cochrane.	Back yards inspected yearly.	None
Renfrew	N. McCormack, M.D.; J. K. Rochester.	Yes; yes; no .....	.....
Simcoe	J. C. C. Grasett, M.D.; W. C. McCall.	Yes; general inspection every spring by sanitary inspector and M. H.O. and upon complaint of all nuisances.	Scarlatina, 12 cases; diphtheria, 4 cases, 1 death; typhoid, 1 case; tuberculosis, 2 deaths.

TOWNS.—Continued

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists	Is diphtheria anti-toxine in common use by physicians? Give result of treatment in all cases where possible.	Is disinfection after contagions diseases carried out under the general supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
So far as possible in their own homes; no.	Not generally used as yet.	Not done systematically but will be hereafter; Schering's disinfectant and tablets are used.	Yes; no.....
No.....	Don't think so.....	No.....	No.....
Yes.....	No.....	Yes.....	Yes.....
Yes; houses placarded....	No cases of diphtheria in town.	Under supervision of sanitary inspector.	No; no.....
Yes; placarding and supervision of sanitary inspector.	No cases.....	Yes.....	No.....
Yes; isolation at home and quarantine; no hospital.	Yes; excellent results; rapid recovery.	Yes; Under supervision of health inspector.	Yes; no.....
No hospital.....	Anti-toxine is and will be used by all physicians here.	No; by attending physician.	No.....
Yes; isolation in private houses.	Yes; very satisfactory...	No.....	No; no.....
Yes; house placarded; inmates quarantined; no hospital.	Yes; used in two cases, one proved fatal; administration was at a late stage.	Yes.....	Yes; no.....

TOWNS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Preston	No	Artesian wells and springs.	Yes; no
Palmerston	Don't know	Wells; average 12 feet..	No inspection
Penetanguishene	Yes	Waterworks.....	No
Perth	Used by Board	Wells; average about 14 feet.	No
Port Hope	Yes	Waterworks system by sand filtration from lake and wells.	No
Port Arthur.....	No	Creeks	Yes; once a week by health inspector; no cases.
Ridgetown	Yes	Wells; from 10 to 25 feet.	None
Renfrew	Yes	Waterworks and wells ..	Yes; no tuberculosis occurred.
Simcoe	Yes	Wells; 16 to 20 feet	No

TOWNS.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by an officer of the Board?	Is there systematic removal of garbage, and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses to whole is connected with public sewers?	State No. and kind of noxious trades. (See Sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under the Public Health Act? State in detail the nature of the case, and results of same.
None	Yes; once a year and when deemed necessary; by householders.	No	No	No.
None	By householders....	No	None ..	No.
One; no license; no.	Not systematic	In part of town	None	No.
Three	Fairly systematic ..	No		No.
None	Yes	No; only partial...	Gas works.....	No.
Three; inspected weekly by M. H. O.; offal burned.	Yes; by tender.....	Partial system	None	No.
None; no inspection of carcasses.	Yes; scavengers remove night soil, householders pay cost.	No	None	No.
None	Yes; council grants \$500 to pay scavenger for removing all night soil, \$400 as salary and \$100 to buy lime, etc.; the amount is raised as follows: \$250 from general town fund and the other \$250 is levied on ratepayers at a rate of 50c per family of 5 persons, and 25c per 5 persons over the first five.	Yes; 15 per cent ..	Two tanneries	No.
None	Yes; removal is made at cost of owner or tenant.	No	None	No.

TOWNS.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Smiths Falls	C. L. Easton, M.D.; B. E. Sparham.	Yes; yes at intervals....	Scarlatina, 10 cases, 3 deaths; diphtheria, 5 cases; tuberculosis, 8 cases, 6 deaths.
Sault Ste. Marie	No M.H.O.; J. Bassingthwaighte.	Inspection by sanitary inspector.	Scarlatina, 2 cases; typhoid, 53 cases; tuberculosis, 8 cases, 4 deaths.
Sandwich	H. R. Casgrain, M.D.; C. H. Ashdown.	Yes; when necessary....	None for 1898
Seaforth.	Chas. McKay, M.D.; W. Elliot.	General sanitary inspection at least once a year.	Diphtheria, 4 cases, 1 death; typhoid, 2 cases.
Toronto Junction.....	A. C. Maverty, M.D.; W. J. Conron.	Yes; yes.....	Scarlatina, 38 cases, 2 deaths; diphtheria, 14 cases.
Thorold	R. J. Johnston, M.D.; W. T. Fish.	Yes; action when complaint is made.	Scarlatina, 7 cases; typhoid, several cases.
Teeswater	D. Stewart, M.D.; J. Fairquharson.	Sanitary inspection twice a year.	Tuberculosis, 1 case.....
Thessalon	T. J. McCort, M.D.; S. Hagan.	When complaint is made.	.....
Tilsonburg	C. McDonald, M.D.; A. Raynes.	General sanitary inspection twice a year.	Typhoid, 3 cases
Uxbridge	H. Bascom, M.D.; A. D. Williams.	General inspection in spring, action afterwards on complaint.	Scarlatina, 35 cases; diphtheria, 2 cases; typhoid, 27 cases, 4 deaths; tuberculosis, 1 case.

TOWNS.—Continued.

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxin in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board.	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes; house placarded; no hospital.	Yes	Yes	Schools inspected.....
Yes; by isolation; no hospital.	Yes; not necessary this year.	Not always, as the Board cannot induce the council to appoint a M.H.O.	No.....
Has not been necessary ...	No occasion	Not necessary	Yes
Kept isolated in a room; no hospital.	Yes; no deaths occurred where used.	No; attendant physician gives the directions.	No; no
Yes; isolated in separate room with nurse; no hospital.	Yes; satisfactory results; one patient died but was in a comatose condition when administered.	Only 1 case.....	Yes; no.....
Yes.....	No cases	Yes	No.....
Yes; house placarded and inmates not permitted to leave the house.	Yes	Yes	Yes; no.....
.....	No.....	Yes	No.....
Yes; by placards	Yes; excellent.....	Yes; Formaldehyde regulator kept ready for use.	No.....
Isolation not as systematic as desirable.	Have had very little diphtheria for years; no anti-toxine as yet.	No.....	Yes; no

TOWNS.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the sources of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Smiths Falls	Yes; to M.H.O.	Wells; 30 feet....	No
Sault Ste. Marie.....	No	Lake Superior and river; some few wells are used.	No
Sandwich	No	Water supply is from Windsor and wells.	No
Seaforth.....	No	Wells	No; no
Toronto Junction.....	No; yes	Lake Ontario	No; 1 case; no.....
Thorold	No	Wells; 25 to 35 feet	No
Teeswater	Yes	Wells; from 20 to 50 feet.	Yes; no cases of tuberculosis.
Thessalon	No	Lake Huron	No
Tilsonburg	Yes	Spring water and wells; 10 to 12 feet.	No
Uxbridge	Yes	Wells; 10 to 12 feet	No

TOWNS.—*Continued.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made? How is cost taken care of?	Is there a public sewerage system? If so, what portion of houses to which is connected with public sewers?	State No. and kind of noisy trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
None	Yes; 50c per bbl ..	Only partial	Two tanneries ..	No.
One; not licensed but inspected; no inspection of carcasses.	Not quite systematic; each occupant looks after his own; have 3 scavengers in town and any one can engage them if they wish.	Not a system; about half of the residents use the sewer	None	No.
None	Night soil is buried; garbage burnt.	Partial; about 15 per cent.	None	No.
None	No system	No	None	No.
One; not on a large scale; carted to the crematory; no.	Yes	30 per cent	None	No.
None	Done by house holders.	No	None	No.
None	Householder is instructed to have garbage and night soil removed, the Board of Health supplies a waggon for the purpose.	No	None	No.
Three; fed to hogs; no.	No; householders look after this.	No	None	No.
Three; inspected; no license; offal carried away by farmers; no.	Yes; 20c each house per month.	No	None	No.
One; yes; fed to hogs.	No	No	None	No.

TOWNS.—*Concluded.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Vankleek Hill.....	H. D. McKinnon, M.D.; F. W. Thistlewhaite.	Yes; general sanitary inspection every spring repeated when complaints are made.	Typhoid, 1 case, 1 death; tuberculosis, 3 cases, 3 deaths.
Wingham	W. B. Fowler, M.D.; J. B. Ferguson.	Action taken when complaint is made to Board by sanitary inspector or others.	Tuberculosis, 2 cases, 2 deaths.
Whitby	D. P. Begart, M.D.; Joseph White.	When complaints are made.	Scarlatina, 2 cases; diphtheria, 1 case; tuberculosis, 1 case, 1 death.
Walkerton	G. J. Dickison, M.D.; W. S. Gould.	Yes; yes; and action taken when complaint is made.	Scarlatina, 1 case; diphtheria, 3 cases; typhoid, a few cases; tuberculosis, 3 deaths.
Warton	H. Wigle, M.D.; D. J. Ferguson.	Yes; yes.	Typhoid, 3 cases, 2 deaths
Woodstock	A. T. Rice, M.D.; John Morrison.	Continuous inspection made by sanitary inspector who reports to the Board.	Scarlatina, 2 cases; typhoid, 20 cases.
Walkerville	C. W. Hoare, M.D.; C. H. Robinson.	Yes; once a year, and further action taken when complaint is made.	Scarlatina, 3 cases; diphtheria, 5 cases.

TOWNS.—*Concluded*

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti toxin in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes; houses placarded and quarantined; no hospital.	Yes; results most satisfactory.	Yes	Yes; no
Not systematically; but patient generally isolated	No diphtheria here for years.	Yes	No; no
House isolation	No	Yes	Yes
Yes; as well as can be done in home of patients; patients kept isolated; house placarded; no hospital.	Yes; to a certain extent..	Yes	No; no
Yes; no hospital; house isolation.	Yes; favorable	Yes	Yes; once a year; no...
Yes; houses placarded; no.	Yes; results good	Yes	Yes; yes
Yes; house placarded and inmates quarantined; no hospital.	Yes	Yes	Yes; a resolution passed to this effect but school board absolutely refused to enforce it.

TOWNS.—*Concluded.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the sources of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Vankleek Hill.....	Yes	Wells; from 18 to 25 feet.	No; tests have been made, but tuberculosis occurred.
Wingham	Yes	Wells; 12 to 35 feet.....	No
Whitby	Yes	Wells; from 12 to 30 feet.	None
Walkerton	Yes	Springs giving abundance of water.	Not by a veterinary surgeon; the sanitary inspector looks after the dairies and condition of cows; no tests; no cases
Warton	Yes	Waterworks system; water from Georgian bay.	No; no
Woodstock	Yes	A general distribution of water drawn from outside sources; quality first class; some use wells.	Yes; no; no
Walkervill	Yes	Detroit river	Only a sanitary inspection.

TOWNS.—*Concluded.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the board?	Is there systematic removal of garbage and night soil? If so, on what basis of assessment is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what portion of houses to which is connected with public sewers?	State No. and kind of non-insular trades. (See sec. 63, Public Health Act.) How licensed and regulated?	Have there been any prosecutions during year under Public Health Act? State in detail the nature of the case, and results of same.
None	No	No	None	No.
None	No	No	None	No.
Two; no; boiled; no; inspected at intervals.	No	No	None	No.
Three; yes; boiled and fed to hogs; no systematic inspection of carcasses.	Only by private contract with householder.	Yes	None	No.
None	Not garbage	No	None	No.
Four; yes; fed to hogs; yes.	Yes; done by unlicensed parties at 25c per month.	Only partial; half or two-thirds.	.....	No.
One; not licensed; offal cooked and fed to hogs.	Yes	Yes; very few houses unconnected.	None	No.

CITIES.

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Belleville.....	R. Tracey, M.D.; D. B. Robertson.		Scarlatina, 17 cases, 2 deaths; diphtheria, 10 cases; typhoid, 14 cases, 4 deaths; consumption, 11 cases, 11 deaths.
Brantford.....	F. G. E. Pearson, M.D.; H. F. Leonard.	Yes; yes, also when complaint is made.	Scarlatina, 41 cases; diphtheria, 32 cases, 3 deaths; typhoid, 44 cases, 7 deaths; tuberculosis, 16 deaths.
Chatham.....	Wm. R. Hall, M.D.; Wm. G. Merritt.	Yes; yes.....	Scarlatina, 9 cases; diphtheria, 29 cases, 1 death; typhoid, 61 cases, 1 death; tuberculosis, 9 deaths.
Kingston.....	S. H. Fee, M.D.; W. M. Drennan.....	Yes; yes.....	Scarlatina, 2 cases; diphtheria, 22 cases, 1 death; typhoid, 8 cases, 4 deaths; tuberculosis, 32 deaths November 10th.
Hamilton.....	Isaac Ryall, M.D.; Thos. Beasley.	Inspections are always going on; in summer a general inspection.	Scarlet fever, 214 cases, 10 deaths; diphtheria, 162 cases, 20 deaths; typhoid, 37 cases, 6 deaths.

CITIES.

Is isolation of contagious diseases systematically carried out? State methods adopted and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes, placarding and isolation hospital.	Yes	Yes, thoroughly	No; no
Yes, as well as possible, at houses; placarded in scarlet fever and diphtheria cases.	Yes; results good in most cases.	Disinfection is carried out as far as possible under direction of sanitary inspector.	Schools are visited by M.H.O. and sanitary inspector.
Yes; have two isolation hospitals, nearly all city cases are sent there; when this is not done we isolate them at their homes.	Yes; results are very satisfactory; its use is approved of by all members of the profession and is popular with the public.	Yes	No; no
Yes, by physician in charge by placarding the house; yes.	Yes; results are satisfactory.	No; but the M. H. O. makes due enquiries of the proper disinfection of the houses.	No; no
No; it is when practicable, difficult to carry out in many cases.	Can't say, have no faith in it; patients die after its use.	Yes, lately	Have written all heads of schools recommending that no children be received into school without certificate of vaccination from their family physician.

CITIES.—*Continued.*

Name of municipality.	Are forms for notification by teachers and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Belleville	Yes	Waterworks and wells, 20 to 30 feet deep.	No
Brantford	Yes	About two-thirds use the city supply and one-third from wells 12 to 50 feet.	Yes; no cases of tuberculosis has been reported; tuberculin test will be applied to all dairies.
Chatham	Yes	City supplies filtered water from River Thames to over half the householders, the remainder use wells; depth, 16 feet.	Yes; tuberculin test used; in one herd only one animal showed reaction, in another herd 3 cows did not stand the test and were destroyed.
Kingston	Yes	Lake Ontario	Yes; no; yes
Hamilton	Supplied to physicians only.	City waterworks supply water from Lake Ontario.	Yes; I look upon the tuberculin test as unsatisfactory; "it's a fad which will die in time."

CITIES.—Continued.

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by any officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made? How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses of whole is connected with public sewers?	State No. and kind of notions trades. (See Sec. 63, Public Health Act). How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, any results of same.
None	Yes	Partially so	One tallow and hide storehouse.	Yes.
3 small ones outside city limits; offal is covered with earth and carted away.	No systematic garbage system; night soil is removed by contract, costing 15c. per month and collected by contractor.	Yes; about 775 connections.	Soap works and varnish factory.	A few minor cases.
None in the municipality, those in immediate vicinity are inspected; offal is cooked and fed to hogs; no systematic inspection of carcasses, but inspector does some inspection on market days.	There is of night soil but not of garbage; 20c. per cubic foot is paid for the first 40 feet, over that 10c. per cubic foot.	Yes; don't know, but 12,600 feet of new sewers were constructed this year.	None	No.
Two; no; no.	Yes; night soil at \$2.50 per cubic yd., garbage 10c. for 24 gals.	Yes; don't know	Hide storing, 2; tallow melting, 1; slaughtering of animals, 2; gas mfg. 1; not licensed.	No.
2 slaughter houses of hogs, 1 of cattle and sheep, each permitted but not licensed; offal and blood sent to fertilizing works; carcasses superficially inspected.	Garbage removed from each house weekly by scavengers employed by the Board of Health; night soil removed from privy vaults when notified by inspectors; hygienic certificates from Board of Health; dry earth closets cleaned monthly, cost 25c. per month; scavengers paid \$4.50 per day, amounting to \$616.00 annually; removal of night soil costs \$1.25 per cubic yd.	Public sewers; about 90% of houses are connected.	One fertilizing establishment, which includes blood boiling, bone boiling and slaughtering of horses; gas mfg. five hide storing houses; permitted but not licensed.	No.

CITIES.—*Continued.*

Name of municipality.	Names of Medical Health Officer and Secretary of Board.	Is there general sanitary inspection? Is it repeated at intervals every year? or is action taken only when complaint of nuisance is made to Board?	Contagious diseases.
Ottawa	A. Robillard, M.D.; John Camthray.	Inspection of premises twice a year by assistant inspectors and sanitary police detailed for the purpose.	Scarlatina, 48 cases, 4 deaths; diphtheria, 150 cases, 24 deaths; typhoid, 147 cases, 17 deaths; tuberculosis not reported.
Stratford	J. T. Robertson, M.D.; R. R. Lang.	Yes	Scarlatina, 17 cases, 2 deaths; diphtheria, 32 cases, 4 deaths; typhoid, 18 cases, 2 deaths; tuberculosis, 14 deaths.
St. Catharines	J. Rollinson, Secy.; A. Boulden, S. I.; and M. H. O.	Yes; general sanitary inspection and is repeated twice every year.	Scarlatina, 41 cases, 4 deaths; diphtheria, 4 cases, 1 death; typhoid, 4 cases, 4 deaths; tuberculosis, 17 cases, 17 deaths.
St. Thomas	W. C. Vanbuskirk, M.D.; W. B. Doherty.	Complaints are attended to when made.	Scarlatina, 24 cases, 1 death; diphtheria, 37 cases, 2 deaths; typhoid, 4 cases, 2 deaths; tuberculosis, 14 deaths.
Toronto	Charles Sheard, M.D.; John Blevins.	General house to house inspection once a year, also inspection of complaints as received.	Scarlatina, 628 cases, 17 deaths; diphtheria, 474 cases, 60 deaths; typhoid, 157 cases, 36 deaths.
Windsor	R. Caney, M.D.; S. Lusted.	Sanitary inspection is constantly being made by inspector.	Diphtheria, 5 cases; typhoid, 2 cases, 1 death; tuberculosis, 8 cases.

CITIES.—Continued.

Is isolation of contagious diseases systematically carried out? State methods adopted, and whether any isolation hospital exists.	Is diphtheria anti-toxine in common use by physicians? Give results of treatment in all cases where possible.	Is disinfection after contagious diseases carried out under the personal supervision of an officer of the Board?	Does the Board make systematic inspection of the public schools? Does it require a certificate of vaccination from new school children each year?
Yes; in two isolation hospitals for the purpose.	Yes, as a rule, and with very fair success when cases are seen in time.	Yes	No; no
Yes	Yes; results good.	Yes	
Yes; by placarding house and removal to isolation hospital.	Anti-toxine has been used in a few cases, but successfully.	Yes, by the sanitary inspector.	Compulsory vaccination when deemed necessary
Yes; patients, attendants and all persons who have access to sick room are quarantined for 21 days or more; isolation hospital for smallpox only.	Yes, by almost all physicians in the city; of the cases treated early with anti-toxine not one resulted fatally. Several cases of diphtheretic croup were treated with it and all of them recovered.	Sanitary inspector instructs householders according to rules in Pamphlet No. 1, 1893, issued by Provincial Board.	The Board does not make any inspection of schools; certificate of vaccination is not required.
Yes; quarantine of uninfected inmates of house, daily visit of quarantine officers, houses placarded and funerals prohibited; yes.	Yes	Yes	Yes; yes.. ..
Isolation hospital for smallpox, other contagious diseases treated in the homes of patients.	Yes; results satisfactory..	Yes, by the inspector...	Yes; all the pupils not previously vaccinated are now being vaccinated.

CITIES.—*Concluded.*

Name of municipality.	Are forms for notification by teacher and M. H. O. of contagious diseases supplied?	Give the source of water supply used on the premises. If from wells, state usual depth of water bearing stratum.	Is there systematic inspection of dairy cows made during the year? Have cases of tuberculosis occurred, and state whether the tuberculin test has been used.
Ottawa	M. H. O. has forms to notify teachers.	Ottawa river; no wells.	Yes; cases of tuberculosis have occurred and tuberculin test applied. A certificate to the effect that such a test has been applied is a condition required before obtaining license of milk vendor.
Stratford			Yes
St. Catharines	Forms are supplied to teachers by the Board.	Waterworks and a few wells.	A monthly inspection of dairy cows is made; no cases of tuberculosis have occurred.
St. Thomas	No	Waterworks	No
Toronto	Yes	Lake Ontario	Yes
Windsor	Yes	Waterworks, water from Detroit river.	Yes

CITIES.—*Concluded.*

How many slaughter houses in municipality? Are they licensed on evidence of being kept in good sanitary condition? How is offal disposed of? Is there systematic inspection of carcasses by an officer of the Board?	Is there systematic removal of garbage and night soil? If so, on what basis of cost is the removal made. How is cost calculated?	Is there a public sewerage system? If so, what proportion of houses of whole is connected with public sewers?	State No. and kind of noxious trades. (See Sec. 63, Public Health Act). How licensed and regulated?	Have there been any prosecutions during the year under Public Health Act? State in detail the nature of the case, any results of same.
No licensed slaughter houses in the city; no systematic inspection of carcasses.	Night soil is removed by contract to farm lands as well as animal and vegetable matter, such as market sweepings, manure and kitchen refuse, as fertilizers; in both cases the expense is paid by the person for whom the work is done.	Yes; about $\frac{1}{4}$ of the houses are connected with the sewers.	Hide inspection; storage of hides, soap boiling, gas mnfg., junk stores; licensed.	Some done by the sanitary inspector.
.....	Yes	Yes .....	.....	.....
3; no license; market inspector inspects all meat offered for sale.	Night soil and garbage are removed by the scavengers; cost 25c. per bbl.; paid by the householder.	Yes; the proportion of house connections is 10 to 100.	Tanneries, 3; soap factory, 1; storing of hides, 2.	No.
1, a pork packing establishment; offal is carried out of the city and used for fertilizing purposes; no systematic inspection of carcasses.	Yes; removed by persons who work on their own responsibility; cannot give cost.	Yes; about 20% connected.	1 slaughterhouse for hogs; 3 hide store-houses; 1 soap boiling; 1 gas mnfg.	One clergyman was brought before the magistrate for mingling with the public while his two children had diphtheria; magistrate decided that he did not violate the law; case dismissed.
33; regulated in accordance with sec. 9, Schedule A, P. H. Act; offal removed to outside of city by private parties.	Garbage removed twice a week by city scavengers; night soil removed by private contractors.	Yes .....	.....	(See page 33.)
None	Removed by contract under supervision of inspector; costs \$2.50 to \$3; night soil is removed when required by approved appliances at the cost of householder of 25c. per bbl.	The principal streets are provided with sewers; I have no data as to connections, but is estimated by inspector that $\frac{3}{4}$ of the houses are connected.	None	3 prosecutions during the year; 2 for keeping a pig within 70 ft. of a house, and one of a junk dealer for keeping bones and rags, causing a nuisance.

Cases prosecuted in the police court for the year ending October 31st, 1898.

Full and foul privy pits	83	Dumping night soil in River Don.....	4
Establishing new privy pits	4	Offering diseased animal for sale	1
Defective plumbing and drainage	27	For not reporting a case of contagious disease..	1
Foul cellars	14	Breach of plumbing by-law	20
Filthy yards	3	“ ice regulations	6
Filthy premises	10	“ quarantine regulations	2
Foul water on lots	2	“ “ Act to regulate Maternity Boarding	
Foul wells	1	Houses ”	1
Burying contents of privies in yards	2	Breach of “ Act for the Protection of Infant	
Dumping night soil on lot	1	Children ”	2
Number of summonses issued			113
“ cases in court Nov. 1st, 1897			2
“ cases withdrawn			78
“ cases dismissed			7
“ cases fined			24
“ cases remanded for sentence			4
“ cases still in court (October 31st, 1898)			2
			115

Summary of fines imposed.

Nature of offence.	No. of fines.	Amount of fines.
For burying contents of privy pits in yards	1	\$ 5 00 and costs or 10 days.
“ dumping night soil in River Don.....	4	20 00 “ 14 “
“ defective drainage and foul privy pit ..	1	5 00 “ 14 “
“ filthy yard and stable	1	5 00 “ 14 “
“ neglecting to report a case of contagious disease.....	1	1 00 “ 14 “
“ breach of ice regulations.....	3	20 00 “ 14 “
“ “ quarantine regulations	2	11 00 “ 14 “
“ “ plumbing by-law	10	30 00 “ 14 “
“ “ “ Act for Protection of Infant Children ”	1	20 00 “ 6 m'ths.
“ “ “ Act to regulate Maternity Boarding Houses ”.....	1	5 00 “ 10 “
“ “ “ Act to regulate Maternity Boarding Houses ”.....	1	5 00 “ 10 “
Total amount of fines		\$127 00



